Studies on the New Zealand Amphipodan Fauna*

No. 14.—The Genera *Hyale* and *Allorchestes* (Family Talitridae)

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Abstract

The genera *Hyale* and *Allorchestes* are considered distinct and keys are given to the New Zealand species of *Hyale* which are here revised. Seven species of *Hyale* and two of *Allorchestes* are recorded, two of the former being new records for New Zealand.

Introduction and Acknowledgments

The genera treated here are among the more common of the amphipods found in New Zealand rock pools.

I wish to thank Professor E. Percival and the Canterbury University College Council and Library for the use of the late Professor Chilton's specimens and literature. The speedier completion of this work has been made possible through the kind permission of Mr. J. Brodie, of the N.Z. Oceanographic Institute. I wish to acknowledge also with gratitude the advice and assistance of Professor L. R. Richardson, of Victoria University College, under whose supervision the work was originally carried out.

Genus Hyale Rathke

Rathke, 1837: 377.
Stebbing, 1906: 559.
Ruffo, 1950: 54
Gurjanova, 1951: 816

"Sideplate 4 much deeper than 5th. Antenna 1 longer than peduncle of antenna 2. Maxilla 1, palp one-jointed, reaching to base of apical spines of outer plate Maxillipeds, palp 4-jointed Gnathopod 2 in male, 5th joint small, masked behind by 4th. Gnathopod 2 in female, 5th joint produced behind between 4th and 6th. Uropod 3 uniramous. Telson divided." —Stebbing (1906).

This genus is represented in New Zealand by several species from the littoral zone, and particularly from rock pools. It is closely related to the genus *Allorchestes*, and arguments have sometimes been advanced for uniting the two genera. Of the seven species here described, two are newly recorded for the New Zealand region.

Key to the New Zealand Species of Hyale

1.	Antenna 2 longer than the body	*H campbellica*
	Antenna 2 not longer than the body	2
2.	Gnathopod 2 in male, hind margin of 6th segment extremely short	3
	Gnathopod 2 in male, hind margin of 6th segment not extremely short	5
3.	Gnathopod 1, male, 6th segment with serrulate distal margin; peculiarly striated fusiform spine on propod of peraepods 1–5 distally .	*H. maroubrae*
	Gnathopod 1, male, 6th segment without serrulate distal margin; without striated spine as above	4

* This study is part of an investigation carried out at Victoria University College, Wellington, with the aid of a New Zealand University Research Fund Fellowship.

4.	Gnathopod 2, male, palm densely fringed with setules	*H. hirtipalma*
	Gnathopod 2, male, palm not densely fringed with setules .	5
5.	Antenna 2 stout	*H. grandicornis*
	Antenna 2 not stout . .	6
6	Peraeopods 3–5, 6th segment with a very conspicuous serrate spine	*H. media*
	Peraeopods 3–5, 6th segment with no exceptionally conspicuous spine . . .	7
7.	Carpus and propod of male maxilliped greatly expanded and thickly setose .	*H. grenfelli*
	Carpus and propod of male maxilliped not as above	*H. rubra*

Hyale grandicornis (Krøyer), 1845.

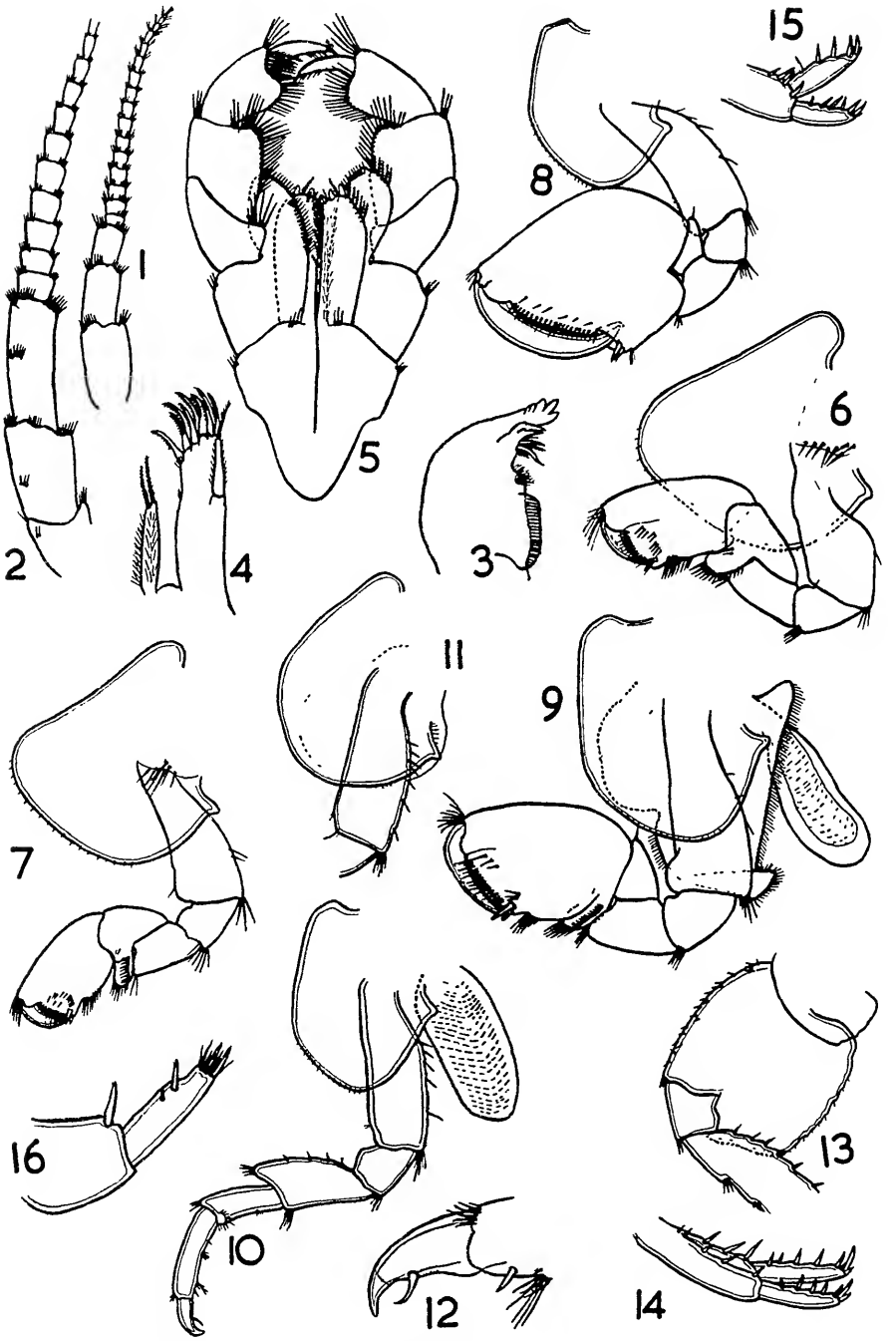
Hyale grandicornis Krøyer, 1845: 292.
Nicea novaezealandiae Thomson, 1879: 235, Pl. 10 B, Fig. 1 a-f.
Nicea neo-zelanica Thomson & Chilton, 1886: 144.
Hyale novaezealandiae Stebbing, 1906: 566–567.
Thomson, 1895: 211.
Chilton, 1909: 643.
Nicholls, 1938: 125, Figs. 64 d-f.
Hyale grandicornis Stebbing, 1906: 566–567.
Barnard, 1916: 230–232.
Stephenson, 1949: 33–37, Figs. 14–15.
Ruffo, 1950: 55.
Barnard, K. H., 1955: 93, Fig 46

Hyale grandicornis forma **novaezealandiae** (Thomson). (Figs. 1–23)

ANTENNAE. *First:* Flagellum longer than peduncle, of 16 segments in male, 10 segments in female; distal segments longer than wide, proximal segments wider than long, rows of small spines or short stout setae on end margins. Peduncle, 1st segment almost as long as 2nd plus 3rd, 2nd longer than 3rd, all have short strong setae distally. *Second:* Flagellum slightly longer than peduncle, of 11–12 segments in male, 13 in female, distal segments longer than wide, proximal segments wider than long, have strong distal fringes of short spines. Peduncle, 3rd segment ⅔ length 4th; 4th ¾ that of 5th; last two have strong distal fringes of short stout spines; 5th has row superiorly about ⅔; 4th has similar smaller row.

MOUTHPARTS. *Mandibles:* Strong tuft of setae immediately above molar process on both mandibles. *First Maxillae:* Inner plate reaches only to base of palp on outer plate; palp bristled, has very strong end seta. *Maxilliped:* Inner plate has 3 stout teeth distally, 6 setulose spines on rounded outer distal angle; similar spines between teeth and down cleft to ischium; a field of strong bristles parallel to these. Outer plate bluntly rounded distally, reaches ½ along carpus; about 6 setulose spines on end of outer margin; field of slightly scabrous spines down inner margin to inner lobe, a break and further field of larger spines to ischium. About 3 short spines on outer distal angles of basos and ischium, similar spines on basos below inner lobe insertion. Merus inner margin ⅓ length convex outer margin, distal margin concave, long spines on inner distal angle. Carpus inner margin, produced in flange a little distally, as long as merus outer margin, distal angle and most of inner margin have long fine spines; outer margin ⅔ length inner. Propod, proximally constricted, inner margin as long as carpus outer margin; tuft of long fine spines on outer distal angle; strong field of long spines on inner distal angle and distal ½ of margin; long setose spines across base of dactylos which is ¾ propod length, unguiform, has strong end "nail", 5 or so strong setae distally on inner margin.

GNATHOPODS. *First:* Sideplate trapezoid, deeper than wide, minutely spined ventrally, distal angles rounded, posterior margin excavate, about ½ length anterior, strong spines above basos insertion. Basos constricted proximally, posterior margin greatly convex, has median spine, tuft of long fine spines on distal angle Ischium ½ basos length, posterodistal angle spine-tufted. Merus narrower, subrectangular, anterior margin contiguous with proximal ½ of carpus posterior margin, distal margin a little concave so posterodistal angle sharp, has a few setae; ⅔ basos length. Carpus



TEXT-FIG. 1 —*Hyale grandicornis f. novaezealandiae.* 1—Antenna 1, ♂. 2—Antenna 2, ♂. 3—Left mandible. 4—Maxilla 1. 5—Maxilliped. 6—Gnathopod 1, ♂. 7—Gnathopod 1, ♀. 8—Gnathopod 2, ♂. 9—Gnathopod 2, ♀. 10—Peraeopod 1, ♂. 11—Peraeopod 2, ♂. 12—Peraeopod 2, ♂, dactylos. 13—Peraeopod 5, ♂. 14—Uropod 1. 15—Uropod 2. 16—Uropod 3.

as long as merus, distally almost as wide as long, basically subtriangular; anterior margin convex; posterior has free margin produced in lobe between propod and merus and extending past them, lobe has marginal epaulette of spines. Propod ovate, slightly longer than basos, not widening markedly, anterior margin slightly convex, strong tuft of long setae on distal angle; width ½ anterior length and subequal with posterior margin, which is almost straight but interrupted by row of spines of increasing length ½ to ⅔ along; oblique palm ½ propod width, defined by 2 stout palmar spines, has strong field of palmar setae, a few small setae across surface below palm. Stout curved dactylos impinges on palm between spines, has minute spines medially along surface, short setae on inner margin. (*Female*): Basos posterior margin less convex than in male, with 2 spines. *Second:* Sideplate subovate, ventral margin minutely spined, posteriorly excavate, wider than deep. Basos width nearly ½ length, posterior margin has 4 single spines, tuft of spines on angle. Ischium subsquare, nearly ⅓ basos length, distal angle spine-tufted. Merus ½ basos length, distal margin convex, small tuft of spines on sharp posterodistal angle; anterior margin contiguus with small triangular carpus which has stout single spine on anterior angle. Propod 1½ times basos length, greatest width ⅔ length, posterior margin ½ to ⅓ length anterior, as long as palm and marked off from it by 2 stout palmar spines, tuft of small setae on margin below them. Palm slightly convex, oblique, palmar field of numerous fine spines, a few small spines on surface below; palm ending in distinct conical pocket at least as deep as the two defining spines are long. Stout curved dactylos has median row of minute spines on surface, tip fits into palmar pocket. *Female:* Broodplate large, subtriangular, seta-fringed, larger than basos, with marked posteroproximal angle. Gills as long as basos, somewhat sausage-shaped. Carpus comparatively longer than in male, posterior margin produced in free lobe between and past merus and propod; proximal and posterior lobe margins have epaulette of spines. Propod as long as basos, widest medially, width more than ½ length; posterior margin slightly longer than oblique spine-margined palm, posterior margin interrupted by fringe of spines near distal angle; angle defined by 2 stout palmar spines, between which dactylos tip impinges on margin; a few spines on propod surface, tuft of long setae at outer dactylos base. Dactylos slightly longer than palm, minute spines medially on surface, setae on inner margin

PERAEOPODS. *First:* Sideplate deeper than wide, distal angles rounded but margins straight, narrowing ventrally, ventral margin minutely spined. Gills ovate, as long as basos. Basos width ⅓ length, posterior margin convex, has about 5 single spines. distal angle tufted; anterior has two small spines distally Ischium subrectangular, as long as basos is wide, distal angle tufted. Merus width ⅔ length, length ⅔ basos, posterior margin straight, small tuft of setae on distal angle, about 4 single spines on convex anterior margin, row of 4 strong spines on anterodistal angle. Carpus width ⅓ length, length ¾ merus, linear, tufts of setae on distal angles, small tuft medially on posterior margin. Propod narrower, as long as merus, anterior margin has setae on distal angle only; posterior has 4 small spines, a few setae. Stout curved dactylos ½ propod length, inner margin faintly pectinate, with single curved seta. *Second:* Sideplate subovate, dorsally wider than deep, narrowing ventrally, angles rounded. Gills ovate, ⅔ basos area. About 7 long solitary spines on basos posterior margin. *Third:* Sideplate anterior lobe larger than posterior, little deeper, both ovate, 2 or 3 minute spines on posteroventral angle. Gills ovate, about ¾ basos area. Basos ovate, as wide as long, 7 or so single short stout spines on slightly convex anterior margin, group on distal angle; posterior margin greatly convex, emarginate medially and distally, minutely spined. Ischium ⅓ basos length, subsquare, small stout spines on anterodistal angle. Merus widening distally, width ⅔ length, 2 groups of 3 or more stout spines on serrate anterior margin; 4 single spines on convex posterior margin, spines on distal margin more than ½ its length. Carpus ½ basos length, width ⅔ length, widening distally, tuft of strong spines medially on anterior margin, distal

angles have groups of 6 or more strong spines. Propod width ⅙ length, as long as basos, narrowing slightly, 5 pairs of short stout spines on anterior margin, a few accompanying setae, single spine distally, setae around base of short dactylos, dactylos ⅓ propod length. *Fourth:* Gills ½ basos area. Basos anterior margin has 12 or so short single spines, group at distal angle. Posterior margin minutely spined throughout but spines not extending beyond margin. Merus and propod each as long as basos, carpus ¾ merus length, merus has 6 solitary spines posteriorly, longer than in Pr. 3, otherwise similar. *Fifth:* Shorter than but otherwise like Pr. 4. Basos margins convex, anterior has numerous single and paired short spines; posterior is minutelv spined and serrate, extends down past ischium.

EPIMERAL PLATES. Lack spines. *First:* Subtriangular. *Second:* Anterior margin rounding to oblique ventral; posterodistal angle somewhat produced, rounded, posterior margin sigmoid. *Third:* Subrectangular, anterodistal angle rounded, posterodistal angle produced posteriorly a little; posterior margin sigmoid.

PLEOPODS. Biramous, peduncle shorter than rami, has 2 coupling spines; rami subequal, each with about 20 segments each with pair of plumose setae, numerous long fine scabrous setae (having appearance of frayed tips, much exaggerated in figures) on surface, mostly proximally.

UROPODS. *First:* Rami subequal, shorter than peduncle, each has 4 dorsal spines, 4 or 5 end spines; peduncle has 4 or so dorsal spines on each margin, no long spine between rami. *Second:* Rami as long as peduncle, with 3 or 4 dorsal spines, 4 or 5 end spines; peduncle has about 4 dorsal spines. *Third:* Ramus as long as peduncle, slender and cylindrical, 2 or 3 spines dorsally, 2 on end surrounded by number of long setae; peduncle has single spine on upper distal angle. *Telson:* Lobes separate, subtriangular, apices rounded, 2 small spines on surface.

LOCALITIES. "In corallines," Lyttelton Harbour; Lawyer's Head; Quail Island; Diamond Head, Lyttelton; Taylor's Mistake; Sumner; Dunedin.

HYPOTYPES. Slides C.25, male; C.26, female. (Chilton Collection.)

Hyale grandicornis forma **thomsoni** n.f. (Figs. 24–29.)

COLOUR. "Dark yellow-green" (E. J. B.).

MAXILLIPED. Propod outer margin distally has 3 or so long spines, continuous with fine-combed spines across dactylos base; dactylos a little shorter proportionately. Outer plate has inner margin more spinous; spines in arc almost completely across lobe at merus level; large tufts of setae on basos, ischium and carpus outer distal angles.

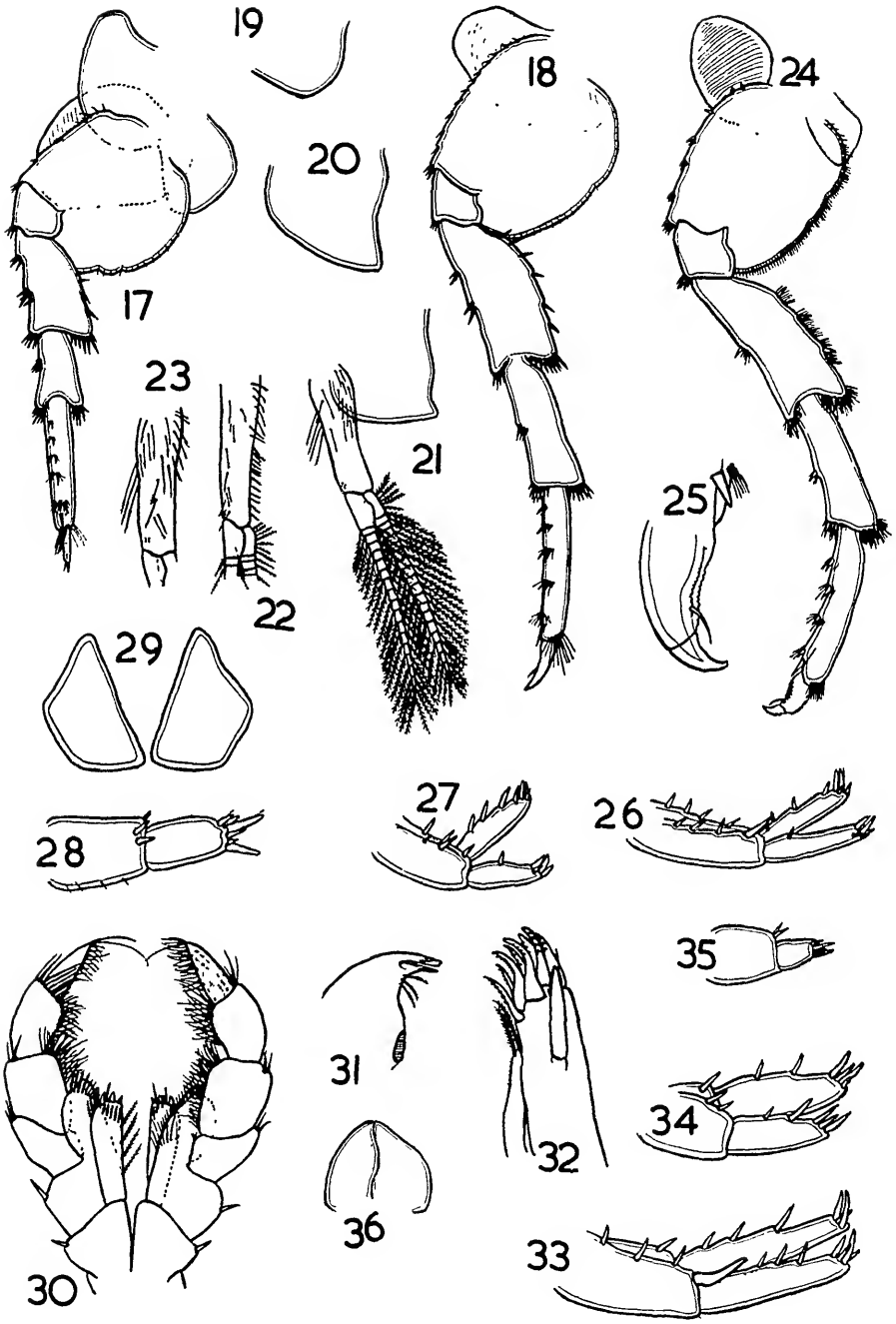
PERAEOPODS. *First:* Merus anterior margin has 1 or 2 setae and spines, tuft of setae ½ along posterior margin. *Third:* Merus posterior margin has 3 spines, tufts of setae around spines. *Fourth:* Fringe of fine spinules all along basos posterior margin. Merus posterior margin has 3 single spines, fringes of setae extending some distance each side of spines; setae and spines on distal angles intermixed, carpus distal angles similar. Dactylos on all peraeopods more strongly pectinate than in f. *novaezealandiae*.

UROPODS. First: One dorsal spine on outer ramus, 4 small spines on inner; both dorsal margins of peduncle spined, a long spine on distal angle extending some distance along rami. *Second:* Outer ramus has 1 spine medially on dorsal margin, inner ramus has 3. *Third:* Peduncle slightly longer than ramus, which has end circlet of about 7 spines; 3 spines on peduncle end.

PLEOPODS First lacks small plumose setae on distal ½ of peduncle outer margin.

FEMALE. Differs from male in lacking spines on outer ramus of uropods dorsally: the pleopods have finely setose spines on the peduncles; the dactylos of the maxilliped is very short and stubby; the fringe of pr 4 basos hind margin is almost absent and there are only solitary projecting spinules.

LOCALITIES. Portobello, Dunedin; Stewart Island; Port Chalmers; Chatham Islands; Little Papanui, Dunedin, cast up on beach, 2 males, coll. E. J. Batham, 24/10/53.



TEXT-FIG. 2—*Hyale grandicornis f. novaezealandiae*. 17—Peraeopod 3, ♂. 18—Peraeopod 4, ♂, 19–20—Epimeral plates 1–2 21—Epimeral plate 3 and pleopod 3 22–23—Pleopods 1–2, peduncles *Hyale grandicornis f. thomsoni*. 24—Peraeopod 4 25—Peraeopod 4, dactylos. 26—Uropod 1. 27—Uropod 2. 28—Uropod 3. 29—Telson. *Hyale rubra* (G. M. Thomson). 30—Maxilliped. 31—Left mandible 32—Maxilla 1. 33—Uropod 1. 34—Uropod 2, 35—Uropod 3. 36—Telson.

TYPES. Slides C.27, male; C.28, female (Chilton Collection).

DISCUSSION: The synonymy of the species *Hyale grandicornis* and *Hyale novaezealandiae* is difficult. The two characteristics which seem to be of most importance in separating the species are the dorsal spination of the 1st and 2nd uropod rami and the presence or absence of spinules along the hind margin of the 4th peraeopod basos In Krøyer's types, redescribed by Stephensen (1949), the peraeopod has spinules and the uropod rami lack spines dorsally. Specimens from Tristan da Cunha differ from the types only in lacking the spinules along Pr. 4 basos, and " seem to agree well with the South African specimens, as described by Barnard " (Stephensen, 1949).

Stephensen (1949) remarks that specimens sent him by Chilton as *H. novaezealandiae* did not belong to the same species as those from Tristan da Cunha, nor as those described from Japan by Iwasa (1939). It is difficult to say to what species Chilton's specimens did belong without examining them, but they would seem from Stephensen's description to be intermediate in characteristics between the two forms I have described since they have no spinules on the hind margin of the 4th peraeopod basos, and yet have only apical spines on the outer rami of the uropods.

The two forms I have described from New Zealand show slightly different combinations of the selfsame characteristics. *H. grandicornis* specimens from the Chilton collection labelled " co-types with *Nicea novaezealandiae* " have been described as forma *novaezealandiae*. In these, the rami of both 1st and 2nd uropods are strongly spined dorsally whilst the hind margin of the 4th peraeopod basos lacks spinules. The specimens described as forma *thomsoni* have 1 dorsal spine on the outer ramus of uropods 1 and 2 and yet have the typical spinules along the 4th peraeopod basos hind margin.

Barnard (1916) lists the differences between the two forms, as he understood them, as " solitary spines on the 4th joint of peraeopods 3–5, marginal spines on both rami of 1st uropod, and 3rd pleon segment with the postero-inferior angle slightly produced ". He states that " none of (these) characters given by Stebbing in 1906, by which Thomson's species can be distinguished from Krøyer's appear to be constantly correlated ". The various forms recorded in the literature support this conclusion. One collection of *H grandicornis* in Chilton's material contained about half of each of the forms I have described, although it is possible they were not taken together in nature. With the exception of these last, in most of the New Zealand material specimens from one locality seem to be all of the same form.

It would appear from this and from Barnard's remarks on the distribution of the South African forms (1916) that one of the several forms predominates in any one population to the almost complete exclusion of the other forms. The differences do not seem to be constant enough in their correlation to be regarded as specific differences, although normally on finding the two forms together one would be tempted without reference to the literature to separate them as distinct species. The apparent constancy of the different combinations of characteristics may possibly be due to a genetic balance within the species influenced perhaps by environmental factors, such as that postulated by Ford (1937 et seq.) to account for the occurrence of melanistic forms of butterflies in English industrial areas.

The recorded variations on the shape of the male second gnathopod are similar to those normally found in different growth stages and occur in both forms.

Hyale campbellica (Filhol), 1885

Allorchestes campbellica Filhol, 1885: 466
Hyale campbellica Stebbing, 1906: 562
Chilton, 1909: 644
Ruffo, 1950: 58.

Chilton (1909) states that Filhol's description of specimens collected on the shores of Perseverance Harbour is " insufficient for identification ". In as much as

Stebbing (1906) keyed out this species from the rest of the genus on the basis of its flagella being longer than the body, it may be possible to correlate it with specimens taken in the future from Perseverance Harbour.

Hyale rubra (G. M. Thomson), 1879. (Figs. 30–50.)

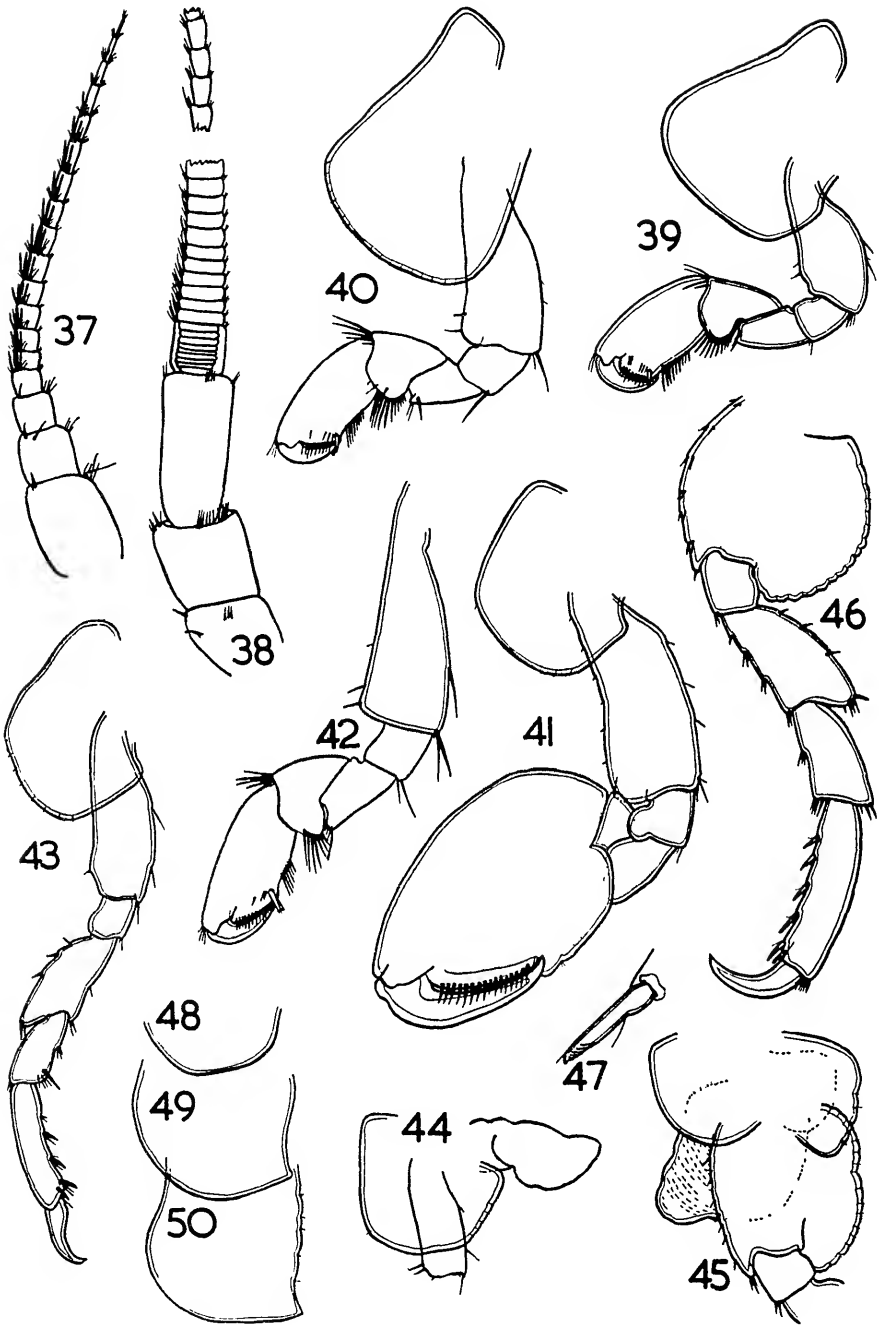
Nicea rubra Thomson, 1879: 236, Pl. 10 b, Fig. 3.
Thomson & Chilton, 1886: 144.
Hyale rubra Stebbing, 1888: 500
Stebbing, 1906: 572
Hyale pontica Thomson, 1899: 205-206 (*not* Rathke).

Like *H. grandicornis f. noveazealandiae* except as below.

ANTENNAE. *First:* Flagellum nearly twice peduncle length, of 14 to 17 segments; superodistal angles of proximal segments with a few setae and up to 4 sensory filaments each; distal segments appear to have only setae, a few setae on inferodistal angles. Peduncle, 3rd segment ⅔ length 2nd, together as long as 1st; each has tuft of setae on inferodistal angles; 1st and 2nd have small stout spine on superodistal angle. *Second:* Flagellum much longer than peduncle, of 37–45 segments; (in Brighton specimen 1st flagellar segment contains 9 small segments inside, suggesting growing point from 1st flagellar segment); superodistal angles have small tuft of setae, inferodistal angles a pair of small setae. Peduncle 5th segment as long as 3rd plus 4th, 4th slightly longer than 3rd, a few small spines distally on each segment, especially 4th and 5th.

MOUTHPARTS. *Mandibles:* Spine row of 3 scabrous spines, lacks usual tuft of setae above molar process. *First Maxillae:* Inner plate bristled; large palp has a fine end seta, a few marginal bristles, reaches a little past base of outermost spine. *Maxilliped:* Inner plate has about 4 setose spines on rounded outer angle; a few setose spines across surface and down cleft to ischium. Outer plate broadly ovate, bluntly pointed distally; oblique row of long fine spines on inner margin at merus level. Stout spine on basos and ischium outer distal angles, 2 spines on merus and carpus. Merus outer margin more than twice length of inner; carpus ovate, slightly longer than merus; field of long setae on inner distal angle and most of margin. Propod slightly longer than carpus, inner margin ½ length of outer, widest distally; long setae on outer distal angle; long fine-combed spines across dactylos base on one side; long fine setae on distal ⅔ of inner margin. Stout dactylos nearly as long as propod, nearly as wide as base; long fine setae on distal ⅔ of inner margin, minute setae in long combs on surface.

GNATHOPODS. *First:* Sideplate subrectangular, widening slightly ventrally; posterior margin not markedly excavate, triangular process not obvious. Basos width ½ length, 2 fine spines on each margin, a few spines on posterodistal angle. Ischium subrectangular, ⅓ basos length, spine and seta on posterodistal angle. Merus narrowing distally, length twice width and ½ basos length, pair of fine spines on sharp posterodistal angle. Carpus has several long spines on anterodistal angle; posterior lobe fringed with 15 or so single spines. Propod subrectangular, as long as basos, twice its own width, a few setae on anterodistal angle, anterior margin barely convex; posterior straight, with medial fringe of about 10 spines of increasing size. Convex oblique palm ½ length of posterior margin, palm has fine marginal spines, a few on surface below. Dactylos longer than palm, aquiline tip impinging against posterior margin. *Female:* Has stout spine on merus posterodistal angle; propod is ¾ basos length, has marginal fringe of about 8 spines. *Second:* Sideplate subsquare, angles rounded, posterior margin barely excavate, has small triangular process. Basos width ½ length, proximally constricted, most of anterior margin produced as flange, several single small stout spines on anterior margin, several longer fine spines on posterior. Ischium ¼ basos length. Propod subovate, greatly expanded; as long as basos, ischium and merus combined; anterior margin convex, posterior barely so; palm oblique, almost straight, has long marginal row of spines; tuft of minute setae



TEXT-FIG. 3.—*Hyale rubra* (G. M Thomson). 37—Antenna 1, ♂. 38—Antenna 2, ♂. 39—Gnathopod 1, ♂ 40—Gnathopod 1, ♀. 41—Gnathopod 2, ♂. 42—Gnathopod 2, ♀ 43—Peraeopod 1, ♂. 44—Peraeopod 2, ♂. 45—Peraeopod 3, ♂. 46—Peraeopod 5, ♂ 47—Peraeopod 5, ♂, spine from propod anterior margin. 48–50—Epimeral plates 1–3.

on propod posterior margin in notch a little below dactylos tip. Curved bluntly-pointed dactylos barely longer than palm, a few setae on inner margin. *Female:* Broodplate large and subtriangular, margins strongly setose. Basos subtriangular, distal width less than ½ length, fine spines on margins, very long spines posteriorly. Propod ¾ basos length, palm more than ½ length posterior margin; 6 spines medially on propod posterior margin, otherwise like 1st gnathopod in male and female.

PERAEOPODS. *First:* Sideplate subrectangular, barely deeper than wide, posteriorly excavate. Basos proximally constricted, a spine on anterodistal angle, 3 on posterior margin. Ischium longer than wide, ¼ basos length, a few setae on posterodistal angle. Merus length more than twice width, a single seta medially on straight posterior margin, a few on distal angle; 3 small stout single spines on convex anterior margin; anterodistal angle produced downwards a little, with stout spine and setae. Carpus length twice width, less than ½ basos length, a few setae on anterodistal angle, distal angle has single long stout spine and several long setae. Propod linear, width ¼ length, length ¾ basos, anterior margin naked, posterior has 5 single stout spines accompanied by setae; these spines seta-tipped with slightly striated tips. Dactylos has minute seta on inner margin. *Second:* Shorter than Pr. 1. Sideplate widening slightly proximally, posterior margin excavate, minutely spined; triangular process not marked; otherwise similar. *Third:* Shorter than other peraeopods; lobes of sideplate subequal; anterior subovate; posterior more rectangular with rounded angles; posterior margin crenulated and minutely spined. Gills almost as large as basos. Basos nearly as wide as long; numerous short single stout spines on anterior margin; posterior medially emarginate, crenulate and minutely spined. Otherwise like Pr. 5. *Fourth:* Basos longer than wide, otherwise like Pr. 5. *Fifth:* Basos ovate, wider than long; paired short spines on anterior margin, posterior crenulate, minutely spined, greatly convex. Ischium subrectangular, about ½ basos length, short stout spines on anterodistal angle. Merus piriform, length ⅔ basos, width ⅔ length; anterior margin straight, serrated with 3 or 4 pairs of stout spines; 2 or 3 stout spines on convex posterior margin, group on distal angle. Carpus ½ basos length, width ⅔ length, like merus in shape, group of spines medially on anterior margin and on distal angle; spines only on distal angle of convex posterior margin. Propod as long as basos, width ¼ length, 5 or 6 single seta-tipped and slightly striated spines on serrate anterior margin, spines with 1 or 2 setae; posterior margin slightly convex, tuft of setae on distal angle. Stout curved dactylos more than ½ propod length, minute seta on inner margin.

EPIMERAL PLATES. *First:* Ovate, small. *Second:* Subrectangular, anterior margin rounding to ventral, posterior margin slightly sigmoid, posterodistal angle sharp and produced a little posteriorly. *Third:* Similar, anterior margin not merging so smoothly into ventral; 4 or 5 minute spines on crenulate posterior margin.

PLEOPODS. Peduncle not markedly setose, shorter than rami.

UROPODS. *First:* Rami slightly longer than peduncle, one ramus slightly shorter than other; both with 3 stout dorsal spines. about 4 end ones; both peduncle margins with a few stout spines; a long seta-tipped stout spine about ⅓ length of rami distally on peduncle. *Second:* Rami slightly longer than peduncle, each has 2 stout dorsal spines, 3 or 4 end ones, one ramus a little shorter than other, a few spines on peduncle. *Third:* Ramus conical, ½ peduncle length, end circlet of at least 6 seta-tipped spines; 2 stout spines on peduncle upper distal angle.

LOCALITIES. Brighton, Otago; Lyttelton; Lawyer's Head, Dunedin; East Coast, South Island; also from Port Jackson, N.S.W., Australia, and from Coogee, N.S.W.; also specimens from Oshoro, Japan, which appear to be *H. rubra,* but in which the gnathopods and peraeopods all have the dactylos distorted. This may be due to an explosion of contents from the dactylos, possibly in mounting, or these may be cast-off moults which the animal has damaged in freeing itself.

TYPES. (Possibly only syntypes or hypotypes) : Tray 59, Slides C.1-C.6, male, and F.1-F.4, female; Chilton Collection.

DISCUSSION. Although resembling *Hyale grandicornis* in the form of the male second gnathopod, this species is quite distinct in several features. These are notably the shape of the sideplates, in particular those of the first and second gnathopods; the crenulated posterior margin of the peraeopod basis; the maxilliped; and the antennae Chevreux & Fage (1925) figure *H. pontica* which differs from these specimens, especially in the propod of the 5th peraeopod (and presumably also in the 3rd and 4th) where they figure 3 spines on the posterior margin as opposed to 6 in these. Stebbing (1906) separates the two species in his key on the grounds that *H. pontica* has a very conspicuous serrate spine on the 6th segment of peraeopods 3 to 5, whereas *H. rubra* has " no exceptionally conspicuous serrate spine ".

The species has not been recorded again since the first description, although Chilton's collection contains slides from several localities.

Hyale maroubrae Stebbing, 1899. (Figs. 51-71.)

Hyale maroubrae Stebbing, 1899: 405, Pl. 32, C.
Stebbing, 1906: 563–564
Barnard, 1916: 229.
Sheard, 1937· 26.
Ruffo, 1950: 56–58

Differs from *H. grandicornis* in the following:

Colour in spirit, white. Eyes round, apart, black or reddish black. *Male:* Length, 3 mm; depth, 1 mm; width, ¾ mm. *Female:* Length, 2½ mm; depth, ¾ mm.

ANTENNAE. *First:* Length 1 mm, reaches about ⅓ along flagellum of antenna 2; length in female ½ mm. Flagellum of 9 segments in male, about 8 in female; twice peduncle length, segments have small setae on distal angles; 1 or 2 sensory filaments on inferior angles, filaments as long as segments. Peduncle, 2nd segment as long as 3rd, both shorter than 1st; all have a few fine setae or spines on distal margins, especially 1st. *Second:* Flagellum of 11 segments in female, 16 to 19 in male, more than twice peduncle length, segments have tufts of small setae on distal angles. Peduncle 3rd segment as long as 4th, ⅔ length 5th; spines and setae on distal margins.

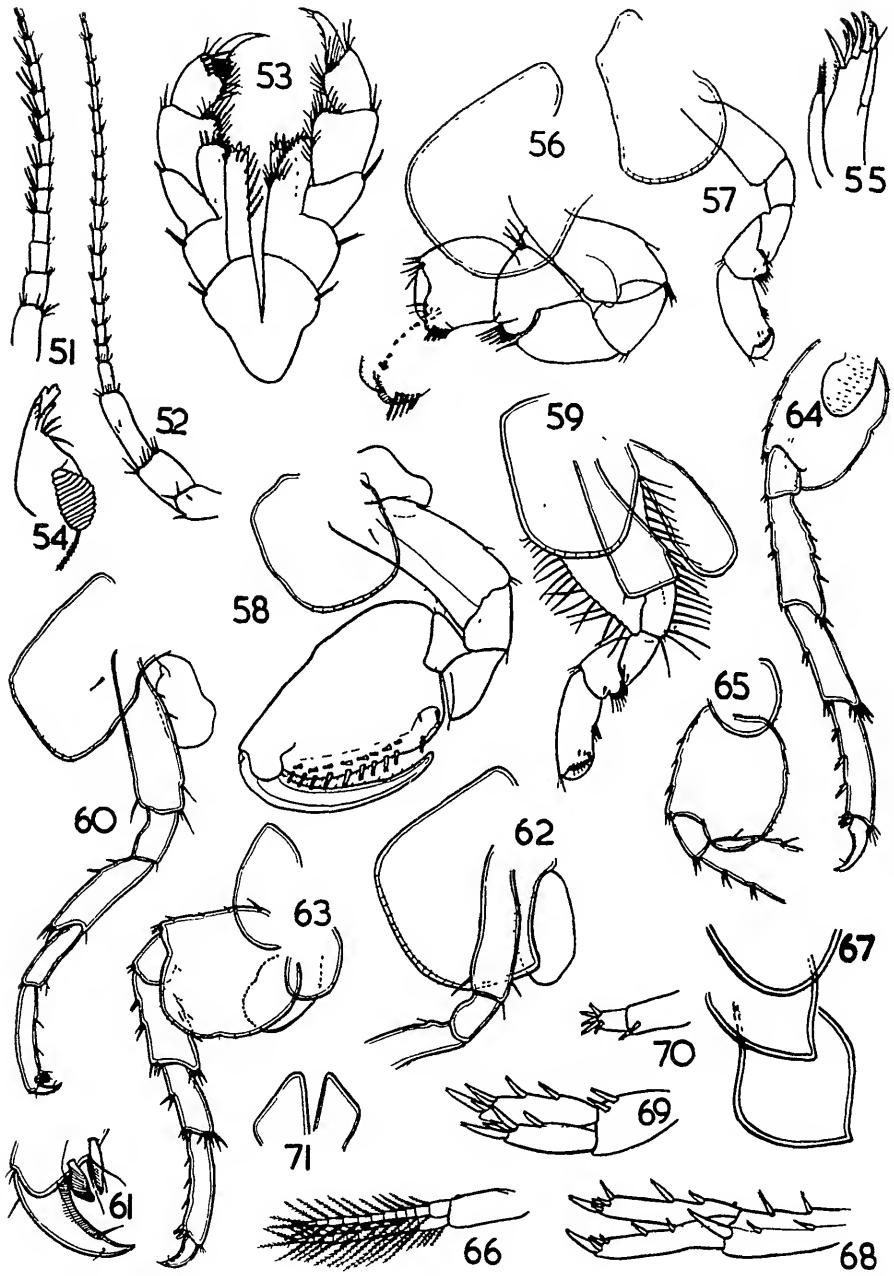
MOUTHPARTS. *Mandibles:* Spine-row of 3 saw-toothed spines; lacks tuft of setae above molar process, long plumose seta on process proximal margin. *First Maxillae:* Palp strong, reaches base of furthermost spine, stout single seta on end. *Maxilliped:* Narrow subrectangular inner plate reaches ½ along carpus, is barely shorter than outer plate; outer distal angle has 3 scabrous spines, a few small scabrous spines on surface, 5 or so long ones down cleft to ischium. Outer lobe broadly rounded distally, field of short scabrous spines distally on inner margin reaching a little past end of inner lobe, an oblique row of 8 or so long fine spines below at merus level. Single stout seta-tipped spine on basos, ischium and merus outer distal angles. Merus inner margin not ½ length outer, single long seta on inner distal angle. Carpus outer distal angle has 2 spines, outer margin ¾ length of inner, distal margin ¾ length of inner margin, numerous long fine setae around distal angle Propod ¾ carpus length, group of long setae on outer distal angle; inner distal angle and distal ½ of inner margin strongly setose as in carpus, oblique row of 5 finely-combed spines across dactylos base on one side, row of 4 similar spines immediately below but slightly less obliquely. Slender dactylos as long as propod, has stout end " nail ", about 4 setae and possibly comb of bristles also on inner margin.

GNATHOPODS. *First:* Sideplate subrectangular, triangular process absent. Basos width ½ length, 2 long spines on anterior margin, spine medially on posterior, pair at distal angle. Ischium subrectangular, 2 small spines posterodistally. Merus ¾ basos length, width ½ length. Carpus as wide as long, width ⅔ that of basos; posterior lobe has fringe of about 8 finely-combed spines, 3 similar spines distally on convex anterior margin Propod width ¾ length, tuft of setae on anterodistal angle; straight

posterior margin interrupted distally by row of about 7 fine-combed spines; posterodistal angle rounded, ridged, giving spiral appearance; palm transverse, medially emarginate but camouflaged by dactylos and a few small spines below palm. Aquiline-tipped dactylos does not reach end of palm. *Female:* Sideplate somewhat as in male, deeper than wide. Basos width nearly $\frac{1}{2}$ length; ischium as long as basos is wide; both almost free of spines and setae. Merus distal margin concave, sharp angle has small spine. Carpus as long as merus, width $\frac{2}{3}$ length; posterior free lobe has fringe of 7 or so spines, pair of spines on anterodistal angle. Propod subrectangular, width more than $\frac{1}{2}$ length, length $\frac{3}{4}$ basos; straight posterior margin has row of 4 spines; slightly oblique palm defined by stout spine on posterodistal angle; a few small spines on palm margin and surface below. Dactylos longer than palm, overlapping it slightly. *Second:* Sideplate subsquare, angles rounded, minutely spined ventrally, not excavate posteriorly, triangular process absent. Gills small, simple, ovate. Basos constricted proximally, width not $\frac{1}{2}$ length, a few short stout spines anterodistally; 5 or so longer spines on posterior margin. Ischium subrectangular, spine distally. Merus subtriangular, widening distally, distal margin slightly concave, length twice distal width and $\frac{1}{2}$ basos length; seta on posterodistal angle. Propod $\frac{4}{3}$ basos length, width nearly $\frac{1}{2}$ length, subtriangular; margins convex, posterior free portion almost lacking, dactylos reaching almost to rounded posterodistal angle; oblique palm has 2 rows of 8 or more stout seta-tipped spines, a few setae between them; palm defined by shallow pocket which receives tip of dactylos. Dactylos as long as basos, fine setae on inner margin. *Female:* Sideplate subrectangular, deeper than wide. Basos subtriangular, 2 single spines posterodistally, short spine anterodistally. Large subtriangular broodplate longer than basos, margins strongly setose. Otherwise like female 1st gnathopod.

Peraeopods. *First:* Sideplate subrectangular, barely excavate posteriorly, no triangular process. Gills simple. Basos slightly constricted proximally, single long spine anterodistally; 3 long spines on posterior margin, pair on distal angle. Ischium posterodistal angle has spine; length twice width, $\frac{1}{3}$ basos length. Merus more or less linear, anterior margin slightly convex, 2 stout single spines anterodistally, pair on anterodistal angle. Carpus narrower, $\frac{2}{3}$ merus length. Propod as narrow, linear, posterior margin has 2 setae; single stout seta-tipped striated spine on posterodistal angle. Below this spine a striated flattened fusiform spine. Dactylos $\frac{1}{3}$ propod length, setule on inner margin near tip, 2nd setule distally on surface, 3rd proximally on outer margin. *Second:* Sideplate larger, wide shallow excavation posteriorly; ventral margin minutely spined; as wide as deep, otherwise like Pr. 1. *Third:* Sideplate anterior lobe subovate. Basos not quite as wide as long, about 4 single stout spines on more or less straight anterior margin. Ischium subrectangular. Merus piriform, width $\frac{1}{2}$ length, length $\frac{3}{4}$ basos; 2 pairs of stout spines on anterior margin, 3 or more on distal angle; 3 stout single spines on slightly convex posterior margin, group on distal angle. Carpus length twice width, $\frac{3}{4}$ merus length, pair of stout spines medially on anterior margin, groups of stout spines on distal angles. Propod linear, width $\frac{1}{4}$ length, 3 single spines on anterior margin, striated seta-tipped spine and fusiform spine anterodistally; dactylos as before. *Fourth:* Longer than Pr. 3. Basos ovate, width $\frac{2}{3}$ length; paired stout spines on anterior margin; convex posterior margin medially emarginate with minute spines, expanded down almost to merus. Segments proportionately longer than in Pr. 3, otherwise similar. *Fifth:* Sideplate small, ovate, a few minute setae on posterior margin. Basos as wide as long, single stout spines on anterior margin, pair on distal angle; posterior margin strongly convex, minutely spined. Otherwise like Pr. 3.

Epimeral Plates. *First:* Semicircular. *Second:* Posterodistal angle sharp, posterior margin slightly sigmoid. *Third:* Posterodistal angle sharp, anterior margin slightly concave, posterior slightly sigmoid.



TEXT-FIG 4—*Hyale maroubrae* Stebbing 51—Antenna 1, ♂ 52—Antenna 2, ♂. 53—Maxilliped. 54—Left mandible. 55—Maxilla 1. 56—Gnathopod 1, ♂. 57—Gnathopod 1, ♀. 58—Gnathopod 2, ♂ 59—Gnathopod 2, ♀ 60—Peraeopod 1, ♂ 61—Peraeopod 1, end of propod and dactylos showing corrugated spines 62—Peraeopod 2, ♂ 63—Peraeopod 3, ♂ 64—Peraeopod 4, ♂. 65—Peraeopod 5, ♂ 66—Pleopod. 67—Epimeral plates 1–3. 68—Uropod 1. 69—Uropod 2. 70—Uropod 3 71—Telson.

PLEOPODS. Peduncle has 1 or 2 long spines; rami of about 11–12 segments with paired plumose setae.

UROPODS. *First:* Rami longer than peduncle; 2 stout spines on dorsal margins, 4 or 5 short and long stout spines on end; 2 stout spines on each dorsal margin of peduncle, a stout curved spine distally reaching ⅓ along rami. *Second:* Rami longer than peduncle, outer shorter than inner, with 1 dorsal spine, 4 end ones; inner has 2 dorsal, 4 end spines; peduncle has 2 strong spines superodistally. *Third:* Ramus ½ peduncle length, slightly narrower, both conical; peduncle has 2 stout spines superodistally, group of 5 stout spines on end of ramus. *Telson:* Cleft, apices subacute.

LOCALITIES. Kaikoura, Akaroa and Lyttelton, New Zealand; Lord Howe Island.

HYPOTYPES. Slides C.29, male, and C.30, female, coll. Feb. 1903, Akaroa, N.Z., from Chilton Collection.

DISCUSSION. Barnard (1916) has recorded this species and described the female from South Africa. Otherwise, with the exceptions listed above, *H. maroubrae* has not been mentioned in the literature since it was first described by Stebbing from Maroubra Bay, N.S.W., Australia, although the Chilton Collection contains material from several localities in New Zealand and from Lord Howe Island. The species is easily distinguished by the shape of the gnathopods and by the peculiar spine on the propod of peraeopods 1 to 5.

These are the first published records from New Zealand.

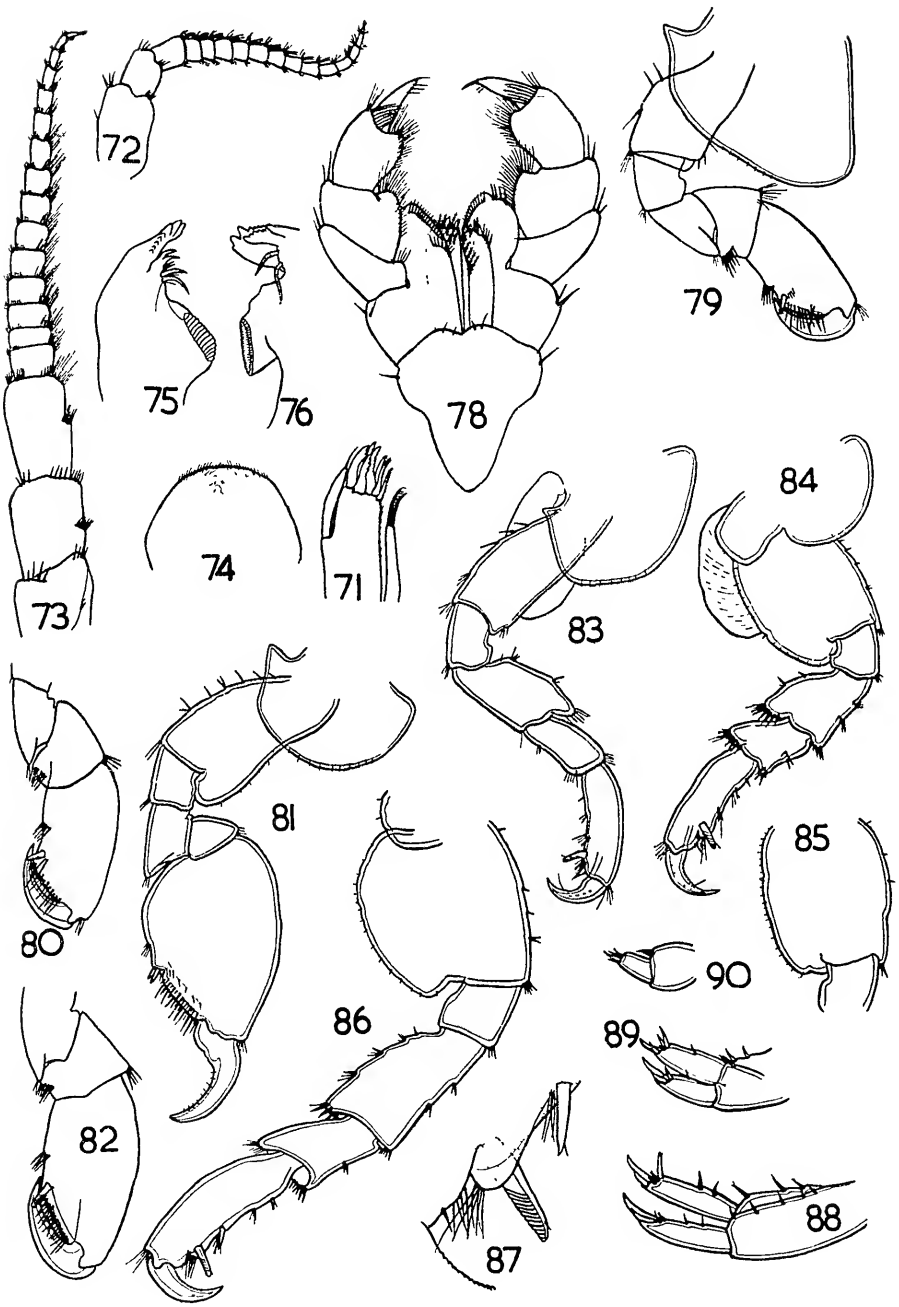
Hyale media (Dana), 1852. (Figs 72-90.)

Allorchestes media Dana, 1852, Pl. 61, Fig. 4.
Hyale media. Stebbing, 1906: 569.
Schellenberg, 1939: 128–129.
Stephensen, 1949: 37–41, Figs. 16–17.
Ruffo, 1950: 60–62, Fig. v.

ANTENNAE. *First:* Flagellum of 11 segments in female, 13 in male, distal angles with tufts of setae, each segment with pair of finger-like sensory setae inferiorly, extending ½ along segments. Peduncle, 1st segment has spine medially on inferior margin. *Second:* Flagellum of 15 segments in male, small brush of setae on inferodistal margin of each, strong tuft of longer setae superodistally; 4th peduncle segment as long as 5th, slightly longer than 3rd, which has a few spines on distal angles; tuft of setae medially on superior margin of 4th and 5th; 5th strongly tufted superodistally, a few small spines inferodistally. Flagellum in female of 13 segments, peduncle and flagellum noticeably more tufted than in male.

MOUTHPARTS. *Mandibles:* Upper article of cutting edge in left has about 8 teeth, lower is bifurcate with fimbriated margins; in right mandible lower is antler-shaped with 6 teeth; spine row of 2 large spines with minute saw-tooth projections on their surface, several much smaller spines. *First Maxillae:* Inner plate does not reach base of spines on outer plate; palp reaches ½ along end spine of outer plate, has strong end seta.

MAXILLIPED Inner plate subrectangular, has about 4 short spines on margin outside end teeth, scabrous setae between and below teeth, 6 or so in cleft row, bristles on plate surface. Outer plate ovate, row of short spines down inner margin past end of inner plate; below this row an obliquely transverse row of several similar spines about merus level. Basos with spine on distal angle; 2 spines below inner plate insertion; ischium, merus and carpus each have pair of short spines on distal angles; propod has tuft of setae. Merus cup-shaped, almost triangular; inner margin ¼ length of outer, 4 or so setae on inner distal angle. Carpus inner margin convex, slightly shorter than width, almost twice length of outer margin; inner surface produced as flange, distal margin of flange and distal ⅔ of lateral margin strongly setose. Propod outer margin slightly longer than carpus inner margin, margins convex, distal margin concave; distal ⅔ of inner strongly setose; setae extend ½ along dactylos; a number of fine-combed long setae on end margin across dactylos base. Stout dactylos



TEXT-FIG 5 —*Hyale media* (Dana) 72—Antenna 1, ♂. 73—Antenna 2, ♂ 74—Upper lip. 75—Left mandible 76—Right mandible 77—Maxilla 1. 78—Maxilliped. 79—Gnathopod 1, ♂ 80—Gnathopod 1, ♀ 81—Gnathopod 2, ♂ 82—Gnathopod 2, ♀ 83—Peraeopod 1 ♂ 84—Peraeopod 3, ♂ 85—Peraeopod 4, ♂. 86—Peraeopod 5, ♂. 87—Peraeopod 5, ♂, propod posterior margin and striated spine 88—Uropod 1. 89—Uropod 2 90—Uropod 3.

as long as inner propod margin, stout single end seta; 2 or 3 smaller setae on inner margin distally.

GNATHOPODS. *First:* Sideplate wider than deep, triangular process medially, a few minute spines ventrally. Basos width more than ½ length, greatly constricted proximally so proximal width barely more than ½ median width; posterior margin has about 3 long spines, anterior about 3 short single spines distally; group of long setae on posterodistal angle. Ischium less than ½ basos length, subrectangular, a few setae on posterodistal angle. Merus posterodistal angle produced downward somewhat, distal margin convex. Carpus lobe has epaulette of fine spines; carpus anterodistal angle has tuft of spines. Propod anterior margin twice length of posterior; tuft of setae on anterodistal angle; posterior margin slightly produced near distal angle with oblique row of fine spines. Palm as long as posterior margin, defined by 2 stout striated spines on distal angle, palm surface minutely deckled, 4 or so setae on propod surface outside palmar spines; surface has row of short and long setae. Dactylos overlaps palm, impinges on posterior margin between palmar spines and row of marginal setae. *Female:* Similar. *Second:* Sideplate distal angles imperceptible. Basos width ½ length, numerous fine spines on convex posterior margin, anterior produced as flange especially distally, has a few minute spines. Ischium subrectangular, longer than wide. Merus subrectangular, distal margin concave, posterodistal angle produced downwards somewhat and hollowed a little to receive propod. Carpus anterodistal angle spined. Propod ovate, almost triangular, anterior margin convex, a few small setae on distal angle; posterior convex, continuous with palm but palm defined by 2 small stout spines; a little below palmar spines margin is interrupted by small tuft of setae; palm ½ length of posterior margin, has at least 2 parallel rows of numerous fine spines. Strongly-curved dactylos ½ length of propod anterior margin, 10 or so fine setae on inner margin. *Female:* Similar to Gnathopod 1.

PERAEOPODS. *First:* Sideplate ovate, tending to subtriangular, as wide as deep, posteriorly excavate with median triangular process. Basos width not ½ length, anterior margin straight, 5 single long spines or groups of spines on posterior margin. Ischium width ⅔ length, length ⅓ basos. Merus more than ½ basos length, convex anterior margin produced slightly downwards distally with 4 single spines or groups of spines and setae; greatest width ⅔ length. Carpus width ½ length. Propod ¾ basos length, more or less linear, 4 groups of 1 or more setae on serrate posterior margin, the last immediately below a large seta-tipped characteristically striated spine situated on a small prominence, below it a tuft of setae and further small spine. Dactylos unguiculate, inner margin has large seta medially; small series of minute spines on surface. *Second:* Sideplate damaged, more ovate and shallower than in Pr. 1; otherwise similar. *Third:* Sideplate anterior lobe wider than deep, minute spines ventrally; posterior much smaller, subrectangular, wider than deep. Gills almost as large as basos. Basos almost as wide as long, margins convex, anterior has about 5 small spines, posterior medially emarginate, with minute spines set back their length from margin. Ischium subrectangular, spined anterodistally. Merus subtriangular, as wide as long, 3 strong groups of spines on anterior margin and angle, group of small spines and setae on posterodistal angle. Propod has 3 single spines with tufts of setae on anterior margin as well as a large striated one, otherwise as in Pr. 1. *Fourth:* Basos subovate, width ¾ length, margins tending to straight; 3 or so single spines on anterior margin, group at distal angle; posterior minutely spined; emarginate about ⅓. Merus proportionately longer than in Pr. 3, otherwise similar. *Fifth:* Basos ovate, as long as wide, anterior margin almost straight, about 5 sets of single or grouped spines; posterior margin expanded as convex flange; margin itself minutely spined; medially emarginate. Merus and carpus proportionately longer and narrower than in Pr. 3; otherwise the same.

EPIMERAL PLATES AND PLEOPODS. Not clearly distinguishable in whole mounts; absent from slides of dissected appendages.

UROPODS. *First:* Rami have 2 spines on each dorsal margin, 4 and 5 large and small end spines; each dorsal margin of peduncle has 3 or more short stout spines. *Second:* Rami subequal, 1 spine medially on each dorsal margin, 4 and 5 end spines. *Third:* Ramus shorter and narrower than peduncle, with end circlet of at least 5 spines; peduncle has 2 spines on superodistal angle. *Telson:* Not easily seen in these specimens.

LOCALITIES. Greymouth, coll. R. Helms; Hokianga, coll. Dr. Cockayne, Feb., 1905; Puhoi Beacon, Auckland Harbour; Little Papanui, Otago Peninsula, coll. E. J. Batham, 24/10/53, 3 ovig. females and 4 females cast on beach.

HYPOTYPES. Slides a1–a5, Tray 47; Slides 1–3, Tray 48; Chilton collection.

DISCUSSION. Most of these specimens were included in the Chilton collection as *Hyale hirtipalma,* a few as *Hyale crassicornis.* They agree well with the descriptions given by Stephensen (1949) in all details except one—the ratio of length of palm to length of free posterior propod margin in the male second gnathopod is nearer 1:2 than 1:1 The 1st and 2nd uropods differ from Ruffo's figures in having the outer ramus spined, not smooth, and they lack the large inter-ramal spine which he figures.

The species may be recognised by the large striated spine on the propod apex of the 1st to 5th peraeopods, and the shape of the male 2nd gnathopod.

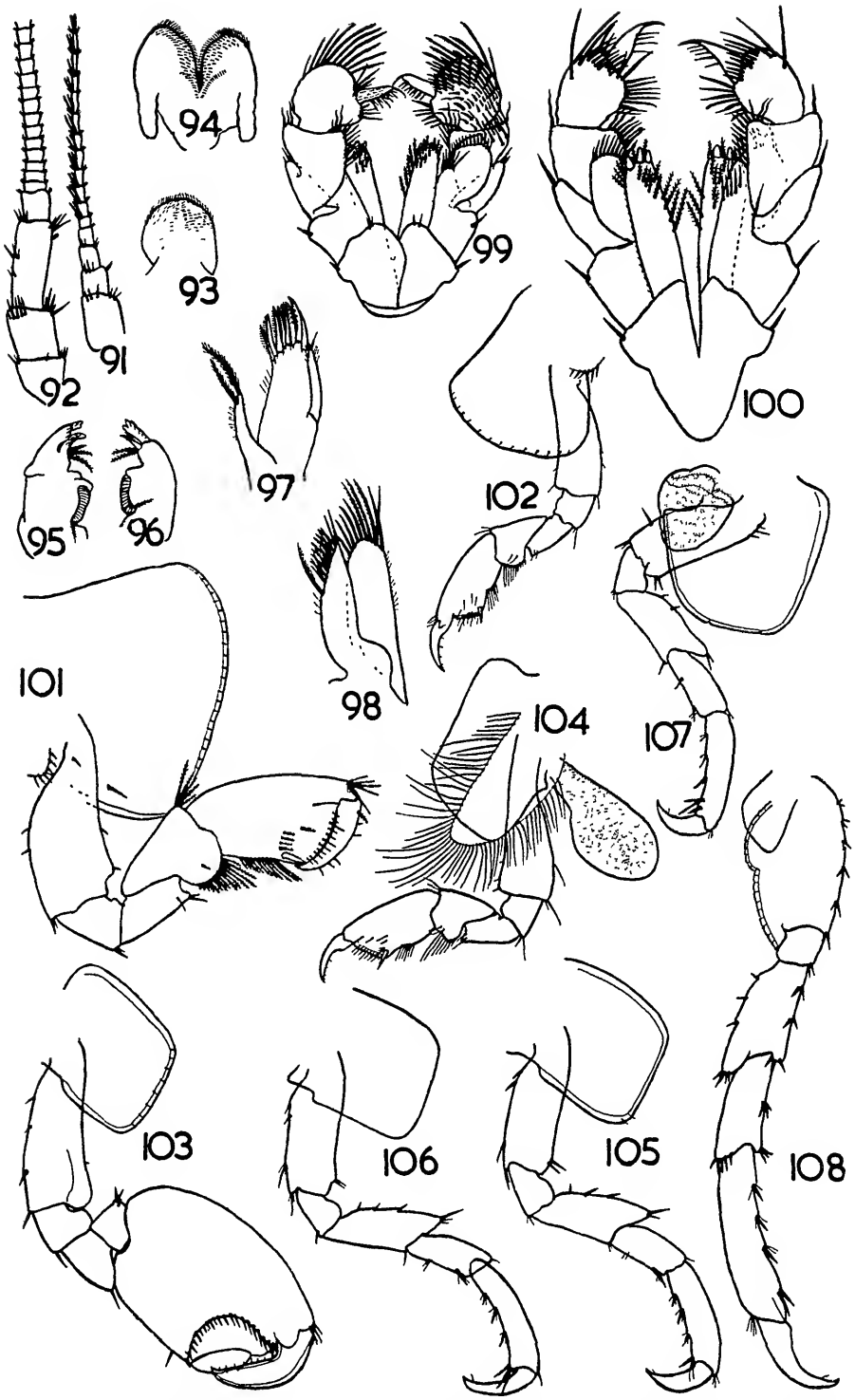
Hyale grenfelli Chilton, 1916. (Figs. 91–117.)

Hyale grenfelli Chilton, 1916: 362–366, Figs. 1–5
Chilton, 1917: 273–276, Figs. 1–3.
Ruffo, 1950: 55, 58.

Male: Length, 6 mm; depth, 1½ mm; width, 1¼ mm. Colour in spirit, pinkish-red with spots midway along body joints between pleon segments. Eyes round, black, apart.

ANTENNAE. *First:* Length 1¾ mm, reaching about ⅓ along flagellum of antenna 2. Peduncle, 2nd segment not ½ length 1st, 2nd as long as third; segments successively narrower, each has setose inferodistal angle, 2 or 3 stout spines on superodistal. Flagellum of 12 segments, inferodistal angles setose, superodistal angles have a few short setae and 2 flaccid sensory setae, the latter as long as segment. *Second:* Length at least 3¼ mm. Peduncle, 3rd segment about ½ length 4th, 4th more than ½ length 5th; distal angles setose; 5th has 2 groups of setae on superior margin, single plumose seta near distal angle of inferior. Flagellum much longer than peduncle, broken but of more than 31 segments; distal angles setose.

MOUTHPARTS. *First Maxillae:* Inner plate shorter than outer; long palp reaches past base of outer plate spines, has bristled end and long single seta. *Mandibles:* Left has spine row of 3 plumose spines; cutting edge of 2 large coarsely-toothed articles. Right, cutting edge of outer article has 2 coarse teeth; inner article has 3 sections, the longer 2 with fimbriated margins; spine row of 2 large plumose spines. *Maxilliped:* Inner plates narrow, reach ½ along carpus, long plumose setae on inner distal surface and margin, a few outside teeth on outer margin, rest of margin bristled. Outer plate almost reaches propod, distally convex with slight blunt apical projection; row of finely-combed setae distally set back almost their length from margin, row ended on inner margin by short oblique row of similar setae at level of merus end; stout spines on outer distal angles of basos, ischium, merus and carpus; merus tapering distally, twice as long as proximal width; carpus subtriangular, arising from merus surface, outer margin slightly shorter than merus, inner margin twice as long as outer, inner distal angle and margin strongly setose. Propod base ½ carpus width, but greatly dilated to spherical shape; one side has rows of long setae. Strong straight conical dactylos as long as propod inner margin, has about 6 pairs of setae on inner margin, rows of short bristles on surface, a long strong nail on end; most of setae



TEXT-FIG. 6.—*Hyale grenfelli* Chilton. 91—Antenna 1, ♂. 92—Antenna 2, ♂. 93—Upper lip. 94—Lower lip. 95—Left mandible. 96—Right mandible. 97—Maxilla 1. 98—Maxilla 2. 99—Maxilliped, ♂. 100—Maxilliped, ♀. 101—Gnathopod 1, ♂. 102—Gnathopod 1, ♀. 103—Gnathopod 2, ♂. 104—Gnathopod 2, ♀. 105—Peraeopod 1, ♂. 106—Peraeopod 1, ♀. 107—Peraeopod 2, ♂. 108—Peraeopod 5, ♂.

on outer plate, carpus and propod have one margin finely-combed. *Female (Chilton's Type):* Carpus slightly longer than wide; single long seta on outer distal angle, row of long setae on inner angle ½ down inner margin. Propod globular, greatly constricted proximally, almost as long as carpus; long marginal setae on distal ½ of inner margin, single long seta medially on outer margin; rows of 2, 5 and 9 long setae further distally, their inner margins finely-combed, the last row across propod immediately below dactylos base. Dactylos slightly shorter than propod, base not ½ propod width, a few stout setae on inner margin.

GNATHOPODS. *First:* Sideplate dilated distally, wider than deep. Basos width ½ length, a few short single spines on margins. Ischium slightly narrower, width ½ length. Merus proximally as wide as ischium, distally narrowing, length about twice greatest width, spined posterodistal angle a little produced. Carpus slightly longer than merus, longer than wide; has about 5 plumose setae on anterodistal angle, posterior free lobe has fringe of about 14 plumose setae. Propod oblong, widening slightly distally, more than twice as long as wide, slender setae on anterodistal angle, fringe of about 10 plumose setae medially on posterior margin, 5 plumose setae on surface level with distal end of fringe, stout spine on each side near dactylos impingement. Palm long, slightly oblique, row of slender spines on each side; dactylos slightly longer than palm, single plumose seta on outer margin near base. *Female:* Basos width more than ⅓ length, a few small setae distally on margins. Ischium subsquare, setae on posterodistal angle. Merus longer and narrower than ischium, has about 2 small setae on acute posterodistal angle. Carpus longer than ischium, piriform, lobe has comb of 10 or more setae; 2 or 3 setae on carpus and propod anterodistal angles Propod more slender than in male, palm defined by large stout spine on each side, fine setae on each side of palm, a few on surface; a few minute setae on inner margin of long curved dactylos. *Second:* Sideplate subsquare. Basos widening distally, has a few spines on posterior margin, anterodistal angle expanded a little to lobe. Ischium slightly narrower, anterodistal angle expanded in lobe. Merus 1½ times ischium length, anterior margin ½ length posterior, posterodistal angle produced downwards somewhat, spined; carpus anterior margin has spined lobe near distal angle. Propod ovate, greatly expanded, as wide as basos is long, greatest width about ⅔ propod length; setae at outer base of dactylos. Palm deeply concave, longer than short stubby dactylos, a little shorter than propod posterior margin, row of small spines on both sides runs in a deep crescentic ring from dactylos base to end of palm; palm produced distally as membranous lobe upon which dactylos impinges; dactylos inner margin has minute spines, does not reach end of palm. *Female:* Sideplate deeper than wide, narrowing slightly distally, slightly excavate posteriorly, slightly larger than female 1st gnathopod, otherwise similar.

PERAEOPODS. *First:* Sideplate subrectangular. Basos width not ½ length, distal angles and posterior margin spined; ischium narrower, width more than ½ length, posterodistally spined. Merus nearly as long as basos, width ½ length, anterior margin spined; anterodistal angle produced downwards a little, posterior margin has seta on distal angle only. Carpus length more than twice width, not quite as long as merus, setae medially and distally, a long spine on posterodistal angle; anterior margin as in propod, setae on distal angle only. Propod as long as basos, width ⅓ to ¼ length, about 4 groups of spines and setae on posterior margin, curved dactylos as long as carpus, has minute setule. *Second:* Sideplate excavate posteriorly, otherwise like Pr. 1. *Third:* Sideplate lobes subequal. Basos not much longer than wide, about 5 setae on anterior margin proximally, 5 spines on rest of margin; posterior margin medially notched, crenulate with fine setae. Ischium short. Merus piriform, as wide as anterior margin is long, anterior margin ⅔ length of posterior; posterior about ⅔ basos length; 3 groups of 2 or 3 spines on anterior margin; posterodistal angle produced downwards a little, with about 3 spines, posterior margin has 2. Carpus about ⅔ merus length and width, has about 4 stout spines on posterodistal

angle, spines medially on anterior margin and angle. Propod narrower, about ⅔ basos length, group of setae on posterodistal angle, posterior margin free as in carpus; about 3 single spines each accompanied by setae on anterior margin, 2 spines and several setae on anterodistal angle. Stout curved dactylos as long as carpus, with minute setule. *Fourth:* Longer than Pr. 3. Basos subovate, wider than long, posterior crenulate margin has fine setae. Other segments have more spines on distal angle than in Pr. 3, otherwise similar. *Fifth:* Longer than Pr. 4. Basos narrow, greatest width ⅔ length; finely crenulate posterior margin has minute setae, is medially emarginate, has about 6 pairs of stout spines on anterior margin; otherwise like Pr. 4.

EPIMERAL PLATES. *First:* Ovate, almost semi-circular. *Second and Third:* Margins sinuous, anterior medially concave, rounding convexly to ventral; 2 or 3 minute setules on posterior margin, margin proximally convex, distally concave; distal angle quite sharp, a little projecting posteriorly.

PLEOPODS Peduncle posterior margin and surface have numerous setae.

UROPODS. *First:* Peduncle as long as rami, about 4 stout spines on peduncle margin dorsally, 1 very large spine distally between rami; about 3 spines dorsally on inner ramus, about 5 on end; 2 spines dorsally and 4 on end of outer. *Second:* Inner ramus the larger, as long as peduncle; 2 spines on end of peduncle; 2 spines dorsally on rami, 4 or 5 on end. *Third:* Peduncle longer and wider than ramus, row of about 9 setae medially on surface; stout seta and 2 spines on superodistal angle; group of about 6 seta-tipped spines on end of ramus. *Telson:* Margins lack spines and setae.

LOCALITIES. Cuvier Island, coll. P. W. Grenfell, Nov., 1915; Moko Hinau Island, coll. C. R. Gow, Dec., 1916 (cf. Chilton, 1916, 1917); Island Bay, Wellington, off *Lessonia,* coll. J. G. Gibbs, 1/8/50.

TYPES. A.1.–A.3., male; B.1.–B.2., female; Tray 45, Chilton Collection.

HYPOTYPES. Slides 89, Personal Collection.

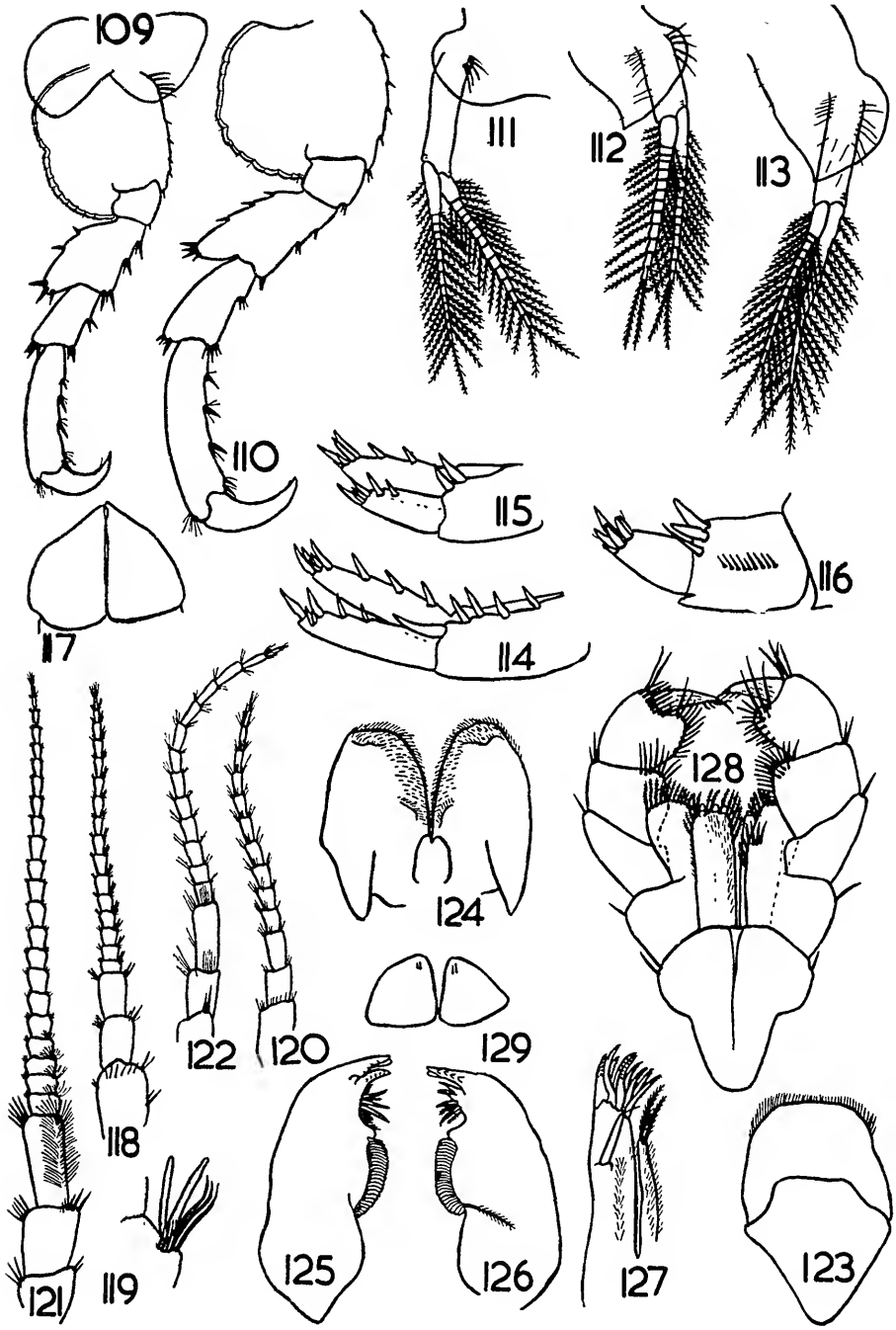
DISCUSSION. *Hyale grenfelli* was first described by Chilton (1916b) from a male collected at Cuvier Island, and the female was later described from Moko Hinau Island, both in the Auckland district. The male described above is one of several taken at Wellington, the only other known locality. The species is distinguished in particular by the peculiar male maxillipeds.

Hyale hirtipalma (Dana), 1852. (Figs. 118–146.)

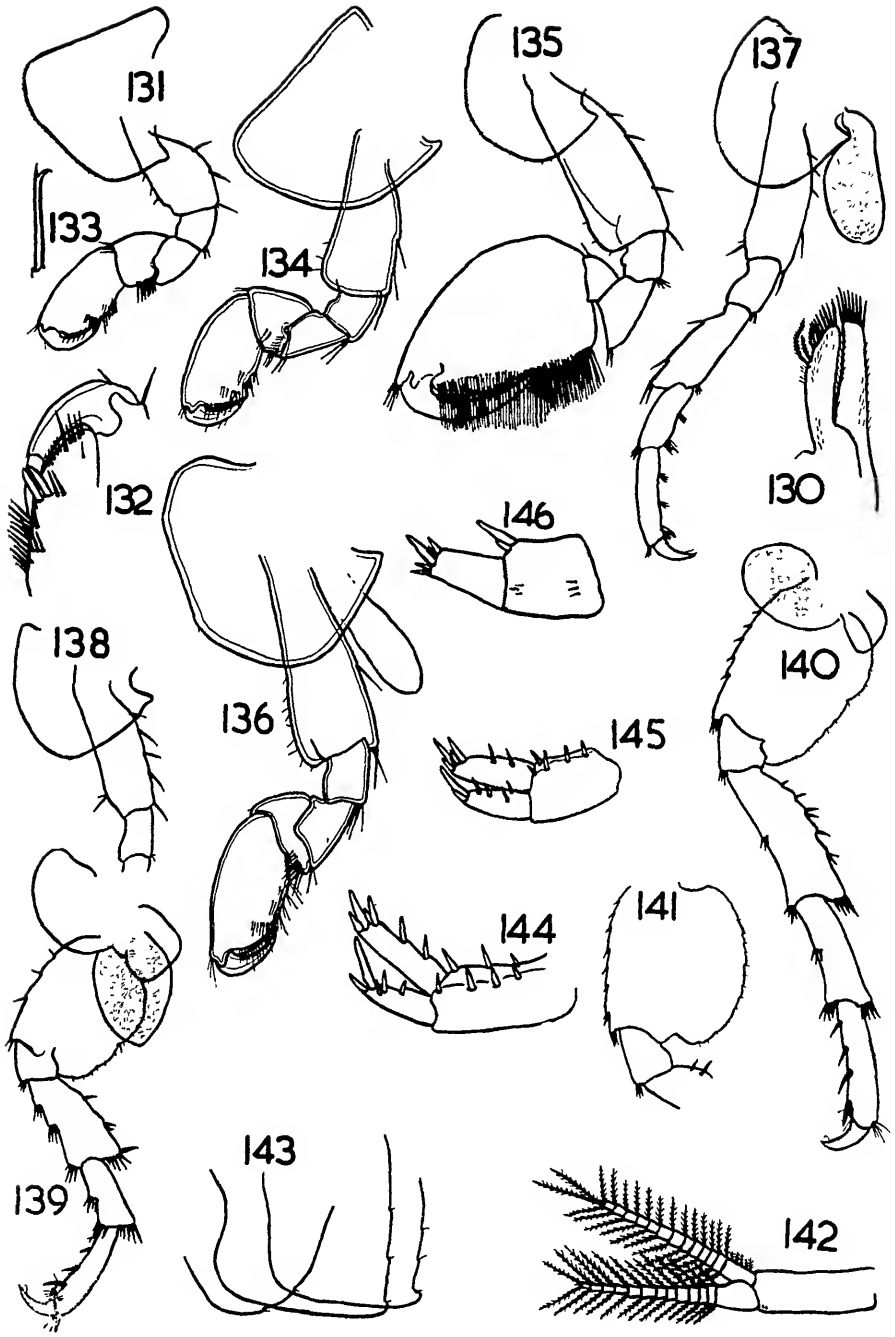
Allorchestes hirtipalma Dana, 1852: 888, Pl. 60, Fig. 4.
Nicea fimbriata G. M. Thomson, 1879: 236, Pl. 10, Fig. B.2.
Hyale trigonochir Walker, 1908: 37–38, Pl. 5, Fig. 5–7.
Hyale hirtipalma Stebbing, 1906: 564.
Chilton, 1909: 643.
Chilton, 1913: 55.
Stephensen, 1949: 30–33, Fig. 13.
Ruffo, 1950: 56, 58.

Male: Length, 8 mm; depth, 2 mm; width, 2 mm; eyes oval. *Female:* Length, 7 mm; depth, 2 mm; width, 1½ mm.

ANTENNAE. *First:* Length 2 mm, reaches about ⅓ along flagellum of antenna 2. Peduncle segments successively narrower and shorter, distally setose, 1st inferiorly setose also. Flagellum of 16 segments in male, 10 in female; tuft of very small setae on superodistal angle; tufts of setae plus pair of long flaccid sensory setae in male inferodistally on segments about ½ along; last segment tufted. *Female:* Peduncle distal angles setose, 1st segment nearly as long as 2nd plus 3rd. *Second:* Length, 3 mm. Peduncle 3rd segment short, wider than long, 2 spines inferodistally, setae superodistally; 4th segment longer, ⅔ length 5th, 2 or 3 spines and setae inferodistally; several setae superodistally; 5th narrower, similar setae superodistally, fringe of extremely fine plumose setae inferiorly. Flagellum of 22 segments in male, 13 in female, last one tufted; first 4 segments inferodistally have tuft of 5 plumose seta like those on 5th peduncle segment; group of short non-plumose setae superodistally, similar groups on distal angles of other segments. *Female:* Flagellum nearly twice



TEXT-FIG. 7.—*Hyale grenfelli* Chilton. 109—Peraeopod 3, ♂. 110—Peraeopod 4, ♂. 111–113—Epimeral plates and pleopods 1–3. 114—Uropod 1. 115—Uropod 2. 116—Uropod 3. 117—Telson. *Hyale hirtipalma* (Dana). 118—Antenna 1, ♂. 119—Antenna 1, ♂, flagellar setae. 120—Antenna 1, ♀. 121—Antenna 2, ♂. 122—Antenna 2, ♀. 123—Upper lip. 124—Lower lip. 125—Left mandible. 126—Right mandible. 127—Maxilla 1. 128—Maxilliped. 129—Telson.



TEXT-FIG. 8.—*Hyale hirtipalma* (Dana). 130—Maxilla 2. 131—Gnathopod 1, ♂. 132—Gnathopod 1, ♂, palm and dactylos. 133—Gnathopod 1, ♂, spine from carpus and propod posterior margin. 134—Gnathopod 1, ♀. 135—Gnathopod 2, ♂. 136—Gnathopod 2, ♀. 137—Peraeopod 1. 138—Peraeopod 2. 139—Peraeopod 3. 140—Peraeopod 4. 141—Peraeopod 5. 142—Pleopod. 143—Epimeral plates 1–3. 144—Uropod 1. 145—Uropod 2. 146—Uropod 3.

peduncle length, segments distally setose; peduncle 5th segment not as setose as in male.

MOUTHPARTS. *Mandibles:* Long plumose seta proximally on molar process, a coarse knob near process distally. Left mandible has spine row of 3 spines, right has spine row of 2 strong spines. *First Maxillae:* Palp has long fine plumose seta on end. *Upper Lip:* Distal margin more or less straight, has distal fringe of setae. *Maxilliped:* Inner plate long, narrow, parallel-sided, has bristled inner margin and surface, stout plumose setae between distal teeth and for short distance each side along lateral margins. Outer plate barely longer than inner, plumose setae on distal margin. Basos, ischium and merus and carpus each have 1 or 2 spines on outer distal angle Merus broad, outer margin more than twice length of inner. Carpus wider than long, inner margin longer than outer with numerous long setae. Propod about carpus size, almost circular, row of long finely-combed setae on outer distal margin; inner distal angle produced distally to blunt lobe, almost forming palm; many long setae on distal ½ of inner margin. Tapering curved dactylos almost as long as propod, a few setae distally on inner margin, has long end nail.

GNATHOPODS. *First:* Sideplate ventral margin oblique, posterior much shorter than anterior. Basos width more than ½ length, 3 small spines on anterior margin, 3 long spines on posterior. Ischium small. Merus slightly larger, posterodistal angle produced downwards in small blunt process. Carpus larger, 3 short stout spines on anterior margin; wide posterior lobe has row of strong bifurcate-tipped setae. Propod as long as basos, margins slightly convex, palm has setae of varying lengths, is slightly longer than free posterior margin; 2 stout spines a little distal to dactylos impingement, margin proximal to spines has numerous bifurcate-tipped setae. Long curved dactylos has tapering apex. *Female:* Sideplate ovate, with acute upward rather than backward triangular projection. Merus as large as carpus, ½ basos length, posterior margin straight, distal angles spined and acute. Carpus posterior lobe squarish, has epaulette of spines Propod anterior margin ¾ basos length, posterior not ½ length anterior, irregular, more or less straight; posterodistal angle rounded and slightly produced, a few groups of long setae on posterior margin, a few on surface, setae on convex palm Dactylos as long as palm. *Second:* Sideplate narrows distally, lateral margins round broadly to ventral. Basos distal width not ½ length, a few minute spines on rounded anterodistal angle, about 4 long single spines on convex posterior margin. Ischium much narrower, subrectangular. Merus as wide, longer, posterodistal angle producced downwards to sharp apex with pair of setae. Propod greatly expanded, greatly narrowed distally, anterior margin convex, greatest width slightly more than ½ length, group of setae at outer base of dactylos Palm almost parallel to longitudinal axis of propod; nearly twice length of free hind margin, defined by 2 stout spines, a small pocket for dactylos tip, palm itself slightly convex. Long dactylos fits into defining pocket of palm, small setae evenly distributed along inner margin; thick fringe of very fine long plumose setae along entire posterior margin of propod masking palm, palmar pocket, spines and setae *Female*· Basos distal width nearly ½ length, a few setae on anterior margin, long spine medially on posterior, 2 or so setae on distal angle Merus ⅓ basos length, carpus slightly smaller, otherwise like Cn 1, female. Propod ovate, anterior margin ¾ basos length, width and posterior margin each ½ length anterior, about 4 groups of setae on convex serrate posterior margin, on surface also; palm defined by 2 spines at dactylos impingement, has varying-sized setae.

PERAEOPODS. *First*· Sideplate ovate, as wide as deep, ventrally convex with small setae, posteriorly excavate Basos posterior margin slightly concave, anterior margin narrowing somewhat. Ischium long and narrow. Merus about ½ basos length, width ⅓ length, 2 spines on anterior margin, 2 at distal angle, posterior margin lacks spines, distal angle setose Carpus narrower, slightly shorter than merus, 2 tufts of setae on posterior margin, stout spine near posterodistal angle. Dactylos inner margin pectinate

with seta near apex. *Second:* Like 1st. *Third:* Basos expanded, a little longer than wide, anterior margin convex, spined; posterior margin serrate, medially emarginate, has minute setae. Merus ⅔ basos length, has 3 groups of strong spines anteriorly, 2 single spines with setae posteriorly, many spines distally on posterior margin. Carpus narrower and slightly shorter, has spine groups medially on anterior margin and distal angle; several spines distally on posterior margin, rest of margin free. Propod narrower than carpus, as long as merus, has 4 spines each with setae on anterior margin, tuft of setae on dactylos outer base; dactylos as in Pr. 1. *Fifth:* Basos greatly expanded, as wide as long, small single setae on serrate posterior margin, short stout spines on anterior. Merus has more spines posteriorly, less anteriorly than in Pr. 3; segments proportionately longer, otherwise similar.

Epimeral Plates. *First:* Ovate, lateral margins rounding smoothly to ventral, posterior has two small setae. *Second and Third:* Subrectangular, 3 small setae on straight serrate posterior margin, anterior margin of 2nd proximally concave.

Pleopods. Peduncle inner margin has a few long setae proximally. Rami of about 14 segments.

Uropods. *First:* Outer ramus shorter than inner; peduncle has about 7 spines dorsally, outer ramus 3 dorsal and 2 end spines; inner 2 dorsal and 4 end spines. *Second:* Inner ramus as long as peduncle, outer ramus shorter; peduncle has 5 spines dorsally; inner ramus 2 spines dorsally, about 3 long and 3 short end spines; outer has about 2 end and 4 dorsal spines. *Third:* Ramus narrower and shorter than peduncle; 2 spines on peduncle upper distal angle, a few small setae on surface; ramus has 4 short and 3 long end spines. *Telson:* Lobes subacute, 2 small setae on each near apex.

Localities. Tidal pool, Meteorological Station Jetty, Perseverance Harbour, Campbell Island, coll. M. Laird, 28/11/49; Brighton, New Zealand.

Hypotypes. Slides A.7, male; A.6, female; (Campbell Island), personal collection.

Discussion. This species is easily distinguished by the thick fringe of very fine plumose setae on the posterior margin of the propod of the second gnathopod.

The Chilton collection includes a number of slides labelled *Hyale hirtipalma* which I note since most of them have been mentioned in the literature.

(1) *Buffel's Bay* (Cape Peninsula, South Africa), coll. K. H. Barnard. These are *H. macrodactyla* which Barnard has recorded from that locality (Barnard, 1916).

(2) *Ewing Island.* These are very similar to *H. hirtipalma* but differ in the male 1st gnathopod; the peraeopod dactylos also lacks the crenulated inner margin and the propod shape is different. Almost certainly not *H. hirtipalma.*

(3) *South Georgia, 1882–3, Hamburg Museum.* Probably those mentioned by Chilton in his 1913 paper. They differ from *H. hirtipalma* in having Gn. 2, male, stubbier with more spines on the basos posterior margin; 2 spines instead of one on propod inner distal angle of Pr. 1–2; large bushes of setae on posterior margins of Pr. 3–7; Gn. 1 is more setose.

(4) *Greymouth* and *Hokianga.* These are *H. media,* corresponding closely to Stephensen's (1949) (and differing from Ruffo's (1950)) figures.

(5) *Antipodes Islands.* Correspond with South Georgia specimens.

Genus Allorchestes Dana, 1849

Dana, 1849: 136.
Stebbing, 1906: 581

"Distinguished from *Hyale* by gnathopod 2 in male which has the 5th segment produced behind between the 4th and 6th segments, and from *Hyalella* by having the telson more or less divided; sometimes the palp of maxilla 1 agrees with that of *Hyale,* sometimes with that of *Hyalella,*"

The main diagnostic character of this genus is the process of the 5th segment in the male 2nd gnathopod. The females of the two genera, *Hyale* and *Allorchestes,* to quote Barnard (1940), appear to be " indistinguishable ". Although this diagnostic characteristic is unmistakeable in the adult males of *Allorchestes* the generic distinction is slurred over by the development of a similar process in the juveniles of *Hyale,* a process which does not always entirely disappear in the adult males of *Hyale.* The feature is sufficiently troublesome for Reid (1951) to raise the question of " what difference, if any, exists between *Hyale* and *Allorchestes* . . . careful examination of specimens of the latter genus (*Hyale*) often reveals such a lobe of greater or smaller size. . . . In the present specimens (*Hyale perieri*) it is quite large, though it may still be masked by segment 4 as it lies in the cup-like depression of that segment." Earlier, in drawing attention to this fact, Reid (1947) quoted Mr. Clarence R Shoemaker of the United States National Museum as suggesting " that the size of this extension in *Hyale* may be associated with the age of the individual—being large in young males but becoming progressively reduced as maturity is approached," and Reid adds that breeding experiments are necessary to settle this point.

This view, that extension is associated with age, is substantially that put forward by Chilton (1926) and is one with which I agree, it being well exemplified in *Hyale grandicornis.* Yet this does not settle the question of whether the genera should remain separate. This is a case in which the status quo is not unworkable, and the adults of each species seem easily ascribed to one genus or the other, unlike the state in *Orchestia* and *Parorchestia* where separation was not dependent on maturity. Until further evidence to the contrary is available, I believe that there is more to be gained by retaining the smaller genera, and I must admit to a conviction that both are valid genera. Admittedly, they may sometimes raise difficulties, but it is soon obvious from a few adult males which genus is concerned.

Two species of *Allorchestes* are recorded from New Zealand and the Subantarctic Islands.

Allorchestes compressus Dana, 1852.

A. compressa & A. australis Dana, 1852: 205–206.
A. australis & A gaimardii ? Dana, 1853–55, 892, Pl. 60, Fig. a–o.
Allorchestes compressus Stebbing, 1906: 581–582.
Stephenson, 1927: 351.
Allorchestes (compressus Dana ?) Stephensen, 1938: 261.

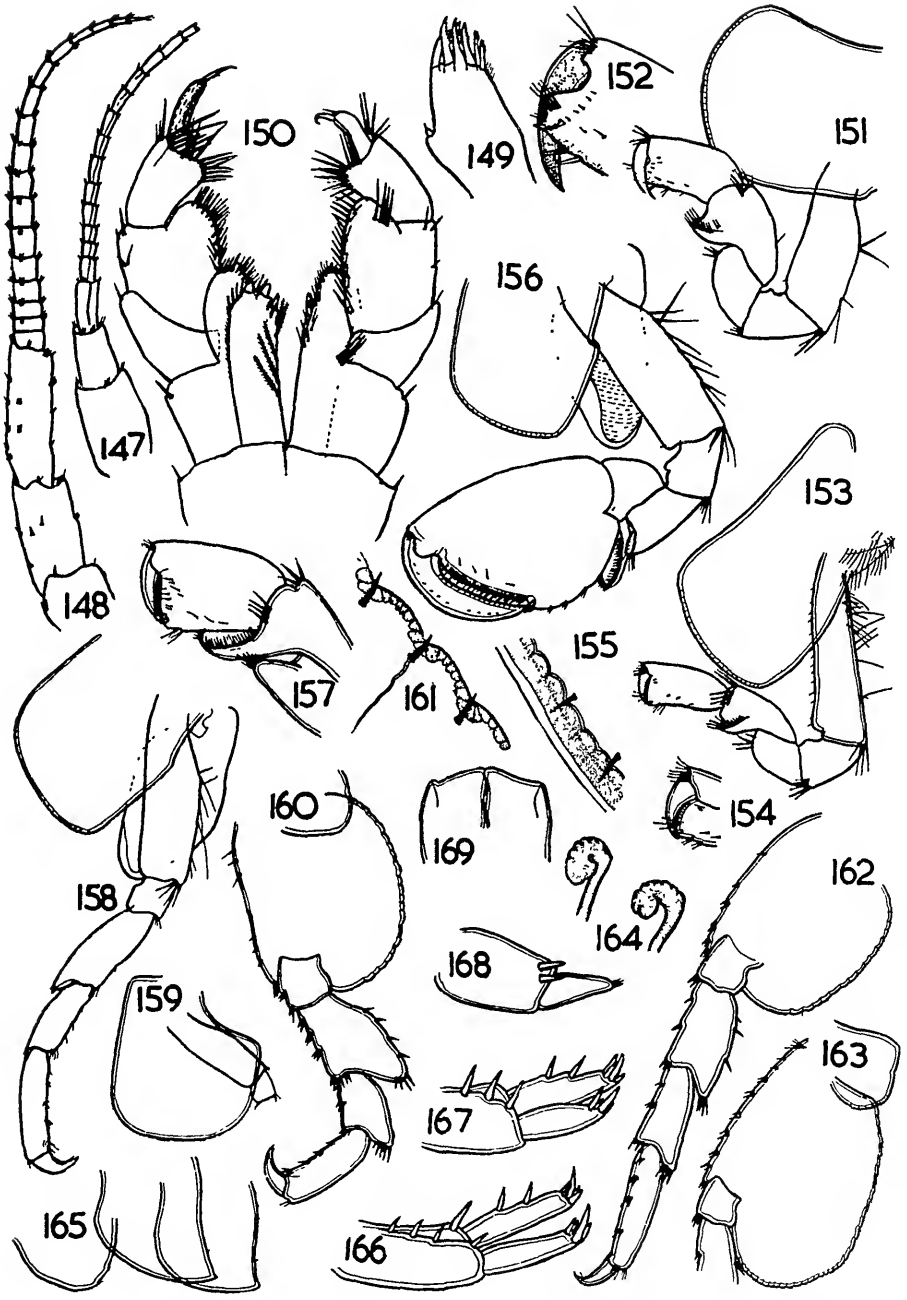
Stephensen records this species from Perseverance Harbour, Campbell Island (1938); and from Port Ross, Auckland Islands (1927), the latter with the information that the species is " new to the subantarctic islands of New Zealand."

I have no specimens and there are none in the Chilton Collection from either New Zealand or the Subantarctic. The species may be distinguished from *A. novizealandiae* in that the finger of the male first gnathopod matches the palm and does not overlap it.

Allorchestes novizealandiae Dana, 1852. (Figs. 147–169).

Allorchestes novizealandiae Dana, 1852: 207 (female).
Allorchestes intrepida Dana, 1852: 207 (male).
Allorchestes novizealandiae Dana, 1853–55: 894, Pl. 61, Fig. 1a-v.
Bate, 1862: 37, Pl. 6, Fig. 3.
Stebbing, 1906: 581.
Chilton, 1926: 517–518.
Stephensen, 1938: 261.
Allorchestes neozelanica Thomson & Chilton, 1886: 144.
Hyale prevostii (partim) Della Vale, 1893: 519.
Hyale chiltoni Thomson, 1899: 206.

Differs from *Hyale grandicornis* f. *novaezealandiae* by the generic characteristics and as below.



TEXT-FIG. 9.—*Allorchestes novizealandiae* Dana. 147—Antenna 1, ♂. 148—Antenna 2, ♂. 149—Maxilla 1. 150—Maxilliped. 151—Gnathopod 1, ♂. 152—Gnathopod 1, ♂, palm and dactylos. 153—Gnathopod 1, ♀. 154—Gnathopod 1, ♀, palm and dactylos 155—Gnathopod 1, ♀, sideplate ventral margin 156—Gnathopod 2, ♂. 157—Gnathopod 2, ♀. 158—Peraeopod 1. 159—Peraeopod 2. 160—Peraeopod 3 161—Peraeopod 3, basos posterior margin 162—Peraeopod 4. 163—Peraeopod 5. 164—Coupling setae from broodplate margins 165—Epimeral plates 1–3. 166—Uropod 1. 167—Uropod 2. 168—Uropod 3. 169—Telson.

Male: Length, 14 mm; depth, 4 mm; width, 4 mm. *Female*: Length, 12 mm; depth, 3½ mm; width, 3½ mm.

ANTENNAE. *First:* Reaches ⅓ along flagellum of antenna 2; flagellum of more than 14 segments, groups of small setae on distal angles; segments subtriangular in cross-section. Peduncle segments have a few small setae on end margins, 1st as long as 2nd plus 3rd. *Second:* Flagellum of 16–18 or more segments, 4 equidistant groups of small setae on end margins. Peduncle, 3rd segment ½ length 4th, 4th about ¾ length of 5th, all distally setose, 2 or so small stout spines on superior margin of 3rd and 4th; 4th has tuft of small setae medially on inferior margin, 5th has 3 tufts on inferior margin, a few on surface, about 5 small spines on superior margin.

MOUTHPARTS. *First Maxillae:* Inner plate reaches base of palp on outer, end seta reaches past base of innermost tooth; palm minute, dome-shaped, has small end seta. *Mandibles:* Spine row of 3 spines, lacks tuft of setae above molar process and scabrous spine below. *Maxilliped:* Inner plate subrectangular, reaches merus extremity, has about 4 small scabrous spines on curved outer angle, a few on surface between and below distal teeth, about 5 long plumose setae down cleft to ischium. Outer plate subovate, has small spines on end and inner margins, down almost to ischium level; about 3 long fine spines on outer margin and ischium level. Basos, ischium and merus have single or paired spines on outer distal angle; basos angle sharp, even produced distally a little. Merus cup-shaped, distal margin concave, inner margin ⅓ length of outer, single long spine on inner distal angle. Carpus large, outer margin ½ length inner, ⅔ merus outer margin, pair of spines medially and on end; inner margin produced as broad flange, rounded distal angle extends nearly ½ along propod, margin mostly fringed with numerous fine spines, row of 4 or more long spines near propod inner base. Propod outer margin as long as merus, inner slightly shorter, wider distally than at base, distal angles fringed with long fine spines, fringe at most extends ½ down inner margin, 6 or so long fine-combed spines across dactylos base. Dactylos nearly propod length, has fine combs of minute setae on surface; end nail nearly ½ dactylos length, has minutely-combed inner margin, 1 to 3 spines at nail base.

GNATHOPODS. *First:* Sideplate subrectangular, anterior margin a little concave, chain of cell-like cavities along ventral. These are also present in other sideplates; nerves are visible running inwards from the minute spines; posterior margin not noticeably excavate, triangular process absent. Basos has 4 or so very long setae on convex posterior margin; group of setae on posterodistal angle, length more than twice width Ischium subrectangular, width ½ length, length ½ basos, long setae on posterodistal angle. Merus as large, has long setae on broadly rounded posterodistal angle. Carpus width ⅔ length, length ¾ basos. has 1 or 2 long setae on anterior margin, group on anterodistal angle; posterior free margin produced between propod and merus as inverted cup-like process with marginal fringe of setae. Propod subrectangular, width ½ length, as long as carpus, has about 4 pairs of fine setae on straight posterior margin, posterodistal angle produced distally in blunt lobe so small palm is proximally excavate; angle has stout spine which is one of semicircular row of 4 across lobe; lobe has several short and long setae. Long dactylos projects greatly beyond posterior margin; surface is minutely scaled; propod anterodistal angle has tuft of setae. *Female*: Sideplate subrectangular width ½ depth. Numerous very long fine setae above basos insertion and proximally on basos posterior margin; basos anterior margin minutely spined, width ⅓ length Ischium, merus and carpus as in male but more slender. Propod similar, but palm simple, slightly convex and transverse, defined by single spine on posterodistal angle; palm has marginal setae, is slightly shorter than dactylos. *Second:* Sideplate subrectangular, deeper than wide, barely excavate posteriorly. Basos constricted proximally, width ⅓ length, posterior margin has several very long setae, setae on distal angle. Merus ½ basos length, ischium slightly smaller, both subrectangular, posterodistal

angles setose, anterior ischium margin has noticeable medial spur, merus posterodistal angle rounded, distal margin concave. Carpus subequal, spoon-like process fringed with setae extending from posterodistal angle between merus and propod and overlying ½ of propod posterior margin. Propod subovate, as long as basos, greatest width ⅔ length, palm barely convex, as long as posterior free margin which has about 3 marginal pairs of small setae; palm has small spines each side, is defined by small pocket for dactylos tip and 2 stout seta-tipped spines. Dactylos inner margin has fine setae, surface has minute spines. *Female:* Carpus posterior margin produced in great pouch-like process fringed with marginal setae and extending ⅔ along propod. Propod as in Gn. 1, female, but proportionately shorter and broader. Otherwise as in Gn. 2, male.

Peraeopods. *First:* Sideplate subrectangular, wider than deep, barely excavate posteriorly. Basos proximally constricted, width not ⅓ length, posterior margin and distal angle have several very long setae. Ischium ¼ basos length, posterodistal angle setose. Merus posterior margin has single seta ⅔ along, small setae on distal angles; length more than twice width, nearly ⅔ basos; anterodistal angle produced downwards a little. Carpus narrower, ¾ merus length, several small setae on straight posterior margin. Propod ⅔ basos length, posterior margin has 5 single spines each with 1 or 2 setae. Dactylos has fine seta on inner margin near tip, margin is faintly pectinate. *Second:* Sideplate strongly excavate posteriorly so L-shaped, as wide as deep; otherwise like Pr. 1. *Third:* Sideplate anterior lobe subtriangular, posterior subovate. Gills simple. Basos greatly expanded, a few stout single spines on more or less straight anterior margin, greatly convex posterior margin is minutely spined and crenulate; chain of cell-like cavities along border as in sideplates of previous appendages, chains continuous distally, are proximally fragmented into groups of cells around spines. From the base of each spine a nerve runs in towards the centre of basos which is nearly as wide as long, expands posteriorly past ischium. Ischium not ⅓ basos length, has 2 pairs of stout spines anteriorly. Merus piriform, nearly ½ basos length, distally as wide as anterior margin is long, posterior margin widens distally, anterior margin has 3 groups of stout spines, serrate posterior margin has 4 single stout spines, stout spines on distal angles. Carpus ⅔ merus length, similar in shape, has 2 groups of spines anteriorly, posterior margin lacks spines. Propod ⅔ basos length, width ⅓ length, posterodistal angle setose, anterior margin has about 4 pairs of short stout spines. Dactylos ½ propod length, otherwise as in Pr. 1. *Fourth:* Basos slightly longer than wide, anterior margin has short stout spines, posterior margin is minutely spined and crenulate, as in Pr. 3. Segments proportionately longer and narrower than in Pr. 3, otherwise similar. *Fifth:* Basos widest about ⅔ along posterior margin, as wide as anterior margin is long, anterior margin has short stout spines, posterior extends ½ down merus, minutely serrate, proximal ⅔ spined, remaining portion crenulate and minutely spined, has cell-chain, otherwise as in Pr. 3.

Epimeral Plates. *First:* Subovate. *Second:* Subrectangular but concave anterior margin rounding to convex ventral margin, posterodistal angle sharp. *Third:* Posterodistal angle sharp, 1 or 2 minute setae on posterior margin.

Pleopods. One ramus is usually longer than the other, but there appears to be no consistency as to which one. Coupling spines anchor-shaped; peduncle has numerous long fine setae proximally.

Broodplates. Have marginal setae modified into hooks like those described by Reid for *A. furcata* (1951). These hooks also occur in *Hyale grandicornis,* but in the latter they are much closer to those figured by Reid, shorter than in *A. novizealandiae,* and much more definitely narrowed before the end hook

Uropods. *First:* Inner ramus has 2 or 3 dorsal spines, outer lacks dorsal spines, each has 4 or 5 end spines; peduncle has 4 spines dorsally on outer margin, one on inner distal angle. *Second:* Inner ramus as long as peduncle, longer than outer, has 2 dorsal spines, 4 end ones; outer lacks dorsal spines, has 4 end spines. *Third:*

Peduncle longer than lanceolate ramus, has 2 spines distally; short spine and 2 setae on end of ramus. *Telson:* Subsquare, cleft medially ½ length, distal margin forms slightly upturned rim.

LOCALITIES. Brighton, Otago, coll. Jan. 1890; Timaru, coll. E. W. Bennett, 1922; Lyall Bay, Wellington; Akaroa; West Coast, North Island; Waipapa Point; Dunedin; Lyttelton; Cape Maria van Diemen; Chatham Islands.

HYPOTYPES. Slides A.1-A.5, Tray 62, male, Chilton Collection (Brighton); Slides C.31, male, and C.32, female (Timaru).

DISCUSSION. *Allorchestes novizealandiae* is easily recognised by the shape of the first and second gnathopods of the male, particularly the first in which the dactylos is greatly longer than the palm. This is possibly the characteristic to which Chilton (1926) refers when he says there is a reliable characteristic by which the adult males can be distinguished from the young males of *Hyale grandicornis* which have a similar carpal process. Other marks of this species are the hook-like setae on the borders of the broodplates, like those figured by Reid (1951) for *A. furcata;* and the chain of cell-like cavities like those which he figures for *A. ornata.* In *A. novizealandiae* these cavities also occur on the posterior margins of the basos of Pr. 3–5.

There has been some difficulty in the past in separating *A. novizealandiae* from *Hyale grandicornis,* but there are numerous differences between the two species, and it should be possible to distinguish young or adult *A. novizealandiae* from young *H. grandicornis* males using the following differences.

	Hyale grandicornis juvenile male	*Allorchestes novizealandiae* male
Gnathopod 1	Fringe of several spines midway along posterior margin of propod	A few very fine setae along propod posterior margin
	Palm straight, horizontal	Palm in form of large tooth
	Dactylos as long as palm	Dactylos overlaps palm by nearly ½ its length
	Sideplate subovate, posteriorly excavate, with spur-like triangular process	Sideplate distinctly subrectangular, without posterior excavation, no triangular process
Peraeopods 1, 2	Sideplate subovate, not markedly deeper than wide	Sideplate rectangular, second L-shaped, and deeply excavate, 1st much deeper than wide.
Peraeopods 3, 4, 5	No sign of cell-like cavities.	Cell-like cavities very noticeable.
Uropod 3	Ramus cylindrical, with 2 or more end spines	Ramus lanceolate, 1 spine and 2 setae on end.
Telson	Cleft to base, lobes subtriangular	Only ½ cleft to base, lobes subsquare.

The telson shape is perhaps the most spectacular of these differences, but all of them, as well as the carpal process of the male second gnathopod, appear to be of very real value in distinguishing the two species, and they are easily picked up in examination.

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